NATIONAL PETROLEUM NEWS

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Mo-Pac Action May Force Cut On Other Rails

By Teletype
N. P. N. News Bureau

TULSA, Dec. 12.—Rail shippers' questions as to how soon they may expect reductions in transportation charges on petroleum products shipped from southwestern refineries to midwestern destinations may be answered within a week.

Definite action by Missouri-Pacific Railway is expected within the next day or two on its proposal to reduce petroleum rates along its line approximately 9 to 9.5 cents a hundredweight (about 0.6 cents a gallon on gasoline).

When Missouri-Pacific announced its intended action, it was called upon to explain the proposed rate reductions before the Western Ass'n. of Railroad Executives. This hearing has been completed and Missouri-Pacific is said to be holding up final publication of the reduced rate scale pending announcement of findings of the executives' group.

While the Missouri-Pacific has not officially announced what action it will take if the executive group's findings are adverse to their proposal, it has been indicated that the Mo.-Pac. line will go ahead and publish the reduced rates.

The proposed rates would affect only points along the Missouri-Pacific lines, including Mid-Continent origin points and such key-point destinations in

(*Continued on page* 18)

Trucks Outhaul Rails In Kansas By 2 to 1

TOPEKA — Trucks hauled 98,156,493 gallons of gasoline and kerosine from Kansas refineries in July-September quarter, rails, 52,805,292 gallons and pipelines, 895,215 gallons, according to figures compiled for NATIONAL PETROLEUM NEWS by Chairman Schoeppel of Kansas Corporation Commission.

There are 1023 transport trucks registered with the Kansas commission, including 364 domestic (Kansas), 621 foreign (out-of-state) and 38 common.

Mapes and Committee in Illinois

This is one of the last pictures of Rep. Carl E. Mapes, Mich. (left), taken as he and two other members of the congressional oil committee, Chairman Cole and Rep. Kelly, Ill. (right), inspected Illinois oil fields just before entraining for New Orleans where the Michigan congressman died Dec. 12

Mapes' Death Ends Cole Oil Hearings

By Telegraph

NEW ORLEANS, Dec. 12.—Congressional oil committee's hearings here were indefinitely postponed today, following the sudden death of Rep. Carl Mapes, Mich., member of the committee. Chairman Cole said it was unlikely that the hearings would be resumed before Congress convenes in January. Statements of witnesses, slated to appear, will be filed with the committee now and be given opportunity to testify later. Only witnesses heard were Col. E. O. Thompson and Jerry Sadler, Texas railroad commissioners, who testified on Monday.

Rep. Mapes was found dead in his hotel room this morning, presumably he died from a heart attack. The Michigan congressman, who was a member of the first Cole oil committee in 1934, appeared in good health at yesterday's hearings and good-humoredly questioned the witnesses. He had served continuously in Congress for 27 years.

Members of the Cole committee will accompany the body to Grand Rapids, Mich., for interment.

"We are all deeply affected by this sudden and shocking occurrence," said Chairman Cole in adjourning the hearings. "Congressman Mapes was one of the fairest, most conscientious, able and lovable men that has served Congress in our time. We will terminate this hearing immediately out of respect for him, subject to call of the chairman."

Mr. Cole went on to say witnesses, slated to appear today, would be permitted to file statements and testify later.

Col. Thompson, chairman of the Interstate Oil Compact Commission, said, on behalf of the compact commission, "We are shocked by the deep loss of so fine a gentleman as Congressman Mapes. We have been uniformly impressed by his fine character, his kindliness and his fine sense of justice."

Thompson Opens Testimony

First witness at the Dec. 11 hearing (the hearings were scheduled to last three days during which state oil officials would be given a chance to express their opinion of the Cole federal oil bill) was Col. Thompson.

The Texan's testimony was devoted chiefly to showing that there was "no need" for federal oil control legislation, declaring that the overproduction problems which had plagued the industry in 1934 had been conquered by the states working in harmony through the Interstate Oil Compact.

"So long as the states are doing workmanlike job, there is no need for federal alarm or control," Thompson added. "Government at Washington should be happy in these days of problems and depressions that there is one American industry not looking to the Government to be saved."

(*Continued on page* 18)

Tanker Convoy Brings Cheers To Gulf Coast

By Teletype

TULSA, Dec. 12. — Gulf Coast refiners' ships came in last week, received a couple of million barrels of petroleum products and natural gasoline from bulging terminal storage to their holds and in return left several million dollars to the account of the supplying refiners.

The transfer came about when a convoyed fleet of 35 French and English boats docked at ports along the Gulf Coast to take on petroleum the two governments are reported already to have purchased, but just hadn't gotten around to freighting across to their home ports. Much of the cargo to be taken back consisted of crude, it was said.

The movement of the 35 boats across to the American ports marks the first successful step in the big-time movement of U. S. petroleum to England and France during the current European War. And, according to observations on the Gulf Coast, this will not be the last time the French and English fleets will come to pick up petroleum for the war machines of the Allies.

The fleet of boats was said to have been convoyed across by at least three battleships. For additional protection, many of the boats were carrying guns, according to the reports. They were manned by English and French navy men and part of their regular crews, it was said.

Refiners Hail Fleet

Gulf Coast refiners had for weeks been anxiously scanning the Gulf of Mexico for the ships that would relieve them of the petroleum and products they had sold to the French and English.

Then last week the boats began dropping anchor at Gulf ports. The fleet that docked did not consist wholly of tankers. Several freighters were seen. One port got "six or eight tankers" from the fleet, according to reports from here. Observers at another port said it was "full of tankers," with six British boats sighted at one time. Other ports strung out along the U. S. Gulf Coast also

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Cole Hearings Close As Mapes Drops Dead

(*Continued from page* 17)

Texas independent producers have increased in numbers by 2000 during the past five years, banks give them easy loans because they know fields will not be ruined by overproduction, Thompson continued. Under state control reserves have continued to increase and the consumer is getting a constantly-improved product at a constantly-reduced price, he said. Production is in balance and "waste" is being increasingly stopped.

"I don't believe that the federal government could do a better job," Thompson insisted. "I strongly believe it is far better to stick by the American form of government and keep control at home where the people have more direct and responsive control over their resources."

Thompson-Wolverton Clash

Congressman Wolverton and Col. Thompson clashed Dec. 11 when the New Jersey member of the Cole committee questioned the compact chairman, trying to show that the August shutdown of Texas fields was designed to aid the oil industry at the expense of the consumer by forcing prices higher.

Thompson countered that the August shutdown, when Humble Oil & Refining Co. cut prices, was to "lock the door before the horse was stolen." He added that shutting down of Texas wells was not new, pointing out that wells in the state will be shut down 12 days this month and shut down two days weekly for the next two years.

He denied that limitation of production necessarily increases price, except theoretically. "Prices," he added, "have continually dropped under Texas proration." It would be disastrous, he said, to reduce prices to a level where stripper wells cannot operate.

Emphasizing Texas' objection to the Cole Bill, Col. Thompson declared that "if the Cole Bill passes, Texas will go into every court to fight it."

Government agencies should remain fact finding bodies with no regulatory powers, he said, adding that federal regulation is not needed.

Chairman Cole asked Thompson if he would concede the right of Congress to acquire oil fields through purchase or condemnation for military use? In reply, Thompson pointed to the fact that he knew of no protest of the government's purchases of helium, adding that the government "has a clear right to purchase for national defense." Oil is always for sale, he added, and the government can buy as other people do.

Texas Railroad Commissioner Jerry Sadler, testifying Dec. 11 bitterly condemned the Department of the Interior's propaganda broadcasts picturing what the broadcasts described as "chaotic" conditions in the industry and portraying oil men and companies as plunderers and pillagers. (See N.P.N., Nov. 1).

The Cole Bill means the abandonment of state rights, he charged, and dissipation of money and energy more profitably used elsewhere.

Federal control of the Texas oil industry which is healthier than ever before, would mean throwing it backward five or six years, while new officials familiarize themselves with conditions and practices, Mr. Sadler told the committee.

The result, he added, may parallel government operation of railroads during the war, and may place the oil man in the position of railroads and farmers with doles.

"No other industry now enjoys such sound financial status" as the oil industry, Sadler said, asking the committee "why destroy the goose that lays the golden eggs?"

Likens Bill to Expropriation

Federal control proposed by the Cole Bill, Mr. Sadler said, is little short of expropriation. It limits private enterprise until competition, the backbone of business, is pushed into the background, thereby foreshadowing monopoly. It is possible to bring states not now having proper proration laws into line without penalizing those which have worked hard and conscientiously for the right to prorate, and to administer these laws properly. The Cole Bill, he charged, "eats away the bone and sinew of democracy."

This Week's Cover

The photographs on the cover of this issue of NATIONAL PETROLEUM NEWS are of a tow and barge used by the Gulf Oil Corp. in its transportation of oil products on the Ohio River.

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Oil Committee Tours Illinois

CENTRALIA, Ill., Dec. 11.—"Some of the Illinois oil fields we visited were operated better than any I have ever seen, but there are some problems that need solution that legislation of some character can provide," Congressman William P. Cole, chairman of the congressional oil subcommittee now taking testimony on the federal oil control bill at New Orleans, declared after a two-day survey of southern Illinois oil fields.

The Cole committee toured the Louden field in Fayette County and the Lake Centralia-Salem field in Marion County, two of the most prolific fields in the state, seeking information on operating conditions, production, waste and other phases of the industry.

The burning of gas produced along with oil in the Lake Centralia-Salem Field near here "undoubtedly is physical waste", Cole said, "but," he added, "there was some indication the operators were attempting to do something about it."

Unrestrained production in Illinois during the last three years was a factor considered by the sponsors of the Cole Bill which was introduced in the last session of Congress, Mr. Cole said.

He intimated that Governor Horner may call a special session of the Illinois legislature to consider conservation problems and intimated that a state oil bill would lighten the pressure for federal regulatory legislation.

Mo-Pac Action May Force Cut On Other Rails

(*Continued from page* 17)

the Indiana Standard territory as Kansas City, St. Louis and Omaha.

Most every railroad serving the northern midwestern and southwestern U. S. has gone on record as favoring the proposed Missouri-Pacific rate cut, according to a spokesman for the Petroleum Rail Shippers Ass'n. The representative said these roads have notified shippers and consignees they will follow Missouri-Pacific in putting into effect the reduced rates that would save shippers as much as six-tenths of a cent on every gallon of gasoline shipped by rail. Thus the proposed rate reduction which started out as a one-line proposition might blanket the entire midwestern and southwestern U. S.

Southeast Involved

With reduced rates applying right up to the back door of the big southeastern consuming area, it was believed rates from the Mississippi River deep into the southeast might be graduated downward also. Most of the oil tonnage entering the Southeast now comes in by tanker to seaports, thence by truck, rail and barge inland.

Publication of the reduced rate scale by Missouri-Pacific is an invitation for an attack on the action, it was said, would probably result in efforts by the opposition to obtain Interstate Commerce Commission suspension and investigation.

The scale of rates Missouri-Pacific proposes to publish along its lines is "certainly a step in the right direction, but is not sufficiently deep to make rail shippers competitive with those who ship by pipelines, truck and water," rail-shipping refiners have said.

See accompanying table for present and proposed rates to Missouri-Pacific and points served by other roads expected to concur with Mo.-Pac.'s reduction.

Rates From Group 3

To:	Present	Proposed
*Kansas City	1.85	1.32
Des Moines	2.38	1.82
Sioux City, Ia.	2.64	2.08
*Lincoln, Neb.	2.38	1.82
*Omaha, Neb.	2.38	1.82
Sioux Falls, S. D.	2.90	2.28
Chicago	2.64	2.08
Freeport, Ill.	2.77	2.18
Wausau, Wis.	3.37	2.67
Duluth, Minn.	3.43	2.74
Bessemer, Mich.	4.16	3.40

*Denotes points along Missouri-Pacific's lines. Rates for other points listed are on the basis of 5.5 cents below levels existing Nov. 14, 1937 and served by other roads expected to concur in Missouri-Pacific's action.

'Gas' Sign Law Declared Void In New Jersey

N. P. N. News Bureau

NEW YORK, Dec. 11. — "He who runs may read", decided the New Jersey Supreme Court in voiding the provision of the 1939 state price-posting law which restricts the placement of gasoline price signs to the dispensing pump. Decision was in the case of Regal Oil Co. vs. State of New Jersey.

The Regal company was fined $50 for allegedly violating the law in question last July, later applying for a writ of certiorari. Regal (called the prosecutor in the court's decision) was said by the state supreme court to be "what is known in the motor fuel industry as an independent retail dealer", and, according to the court, distinguished from a retailer handling nationally-advertised products of major companies.

Because Regal, the prosecutor, according to the court's opinion, was "unable to compete with the major company in its unrestricted right and financial ability to advertise .... the prosecutor's only legitimate weapon of competition is to sell its product at a 'slightly lower price'." To restrict Regal's right to attract "approaching and passing" motorists to this fact was termed "arbitrary and oppressive" by the court.

The Massachusetts supreme court recently upheld constitutionality of a sign law, similar to the New Jersey law's section which was held unconstitutional.

Rehearing on Depletion Denied by High Court

N. P. N. News Bureau

WASHINGTON, Dec. 11. — U. S. Supreme Court today denied a rehearing sought in the depletion allowance case decided several weeks ago, in which it upheld the Treasury Department's ruling that development costs of oil production companies, when charged up as current expenses at the time they are incurred, cannot be treated as capital items in subsequent years so as to permit a larger depletion allowance. Wilshire Oil Co. was defendant in the case. (N.P.N., Nov. 8, p. 25.)

Tractors Top Missouri Program

JEFFERSON CITY, Mo., Dec. 11.—Recognizing the importance of servicing tractors as a revenue source for marketers in agricultural sections, the subject of tractor lubrication, maintenance and fuels will highlight the business session of the annual meeting of the Missouri Independent Oil Jobbers Association at Excelsior Springs, Mo., Feb. 21 and 22.

High Court Will Review Decision in Ethyl Case

N. P. N. News Bureau

WASHINGTON, Dec. 11. — U. S. Supreme Court today agreed to review the Ethyl Gasoline Corp.'s appeal from the decision of the U. S. District Court at New York City which held that its jobber licensing contracts are in restraint of trade and in violation of the anti-trust laws. Argument probably will not be held before late in January.

New Standards For Fuel Oils Issued by U. S.

N. P. N. News Bureau

WASHINGTON, Dec. 9.—The National Bureau of Standards of the U. S. Department of Commerce has announced that a satisfactory majority of producers, distributors and users of fuel oils have accepted the recommended revision of fuel oil standards which were circulated for acceptance in September of this year, and they will be effective for new production from Jan. 5, 1940.

The new standards, which are identified as CS-12-40, will supersede Commercial Standards CS12-38 and are identical in substance with the tentative specifications for fuel oils, D 396-39T of the American Society for Testing Materials.

The only changes in the new standards, which were tentatively announced Sept. 30, are the lowering of the maximum pour point for Nos. 1 and 2 grades and a lowering of the maximum viscosity of No. 3 and lowering the minimum viscosity of No. 5 grade.

The maximum pour point of No. 1 is dropped from 15°F. to zero, while No. 2 drops from 15°F. to 10°F.

The maximum Saybold Universal viscosity for No. 3 is reduced from 55 to 45 seconds at 100°F. The minimum viscosity for No. 5 is reduced from 60 to 50 seconds at 100°F.

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Oil Transportation News

Latest developments in freight rates, legislation, regulations, and new construction affecting transportation of petroleum products by truck, barge, tanker, pipeline, and railroad.

North Carolina to Regulate All Transport Tank Trucks

BULLETIN

RALEIGH, Dec. 12.—State officials today agreed to modify 55-hour week ruling so that truck drivers might be permitted up to 2 hours daily for meals, loading and unloading, so long as their total hours-per-week did not exceed 60, C. S. Schaub told N.P.N.

By Telephone To
N. P. N. Washington News Bureau

RALEIGH, N. C., Dec. 11.—North Carolina's petroleum haulers will probably contest the hours-of-service provisions of the newly promulgated "regulations governing the transportation of petroleum or other combustible or explosive products over North Carolina highways," C. S. Schaub, of Apex, N. C., petroleum transporter and head of the state trucking association said today.

Such regulations, apparently, apply to trucks of oil marketers, although state officials have indicated that they are principally interested in regulating for-hire transporters. It has not been determined as yet whether these regulations will be applied to local delivery trucks in municipalities.

"The 55-hour week provided for operators of petroleum tank trucks will work a hardship on the transporter whose operations are wholly or mostly intrastate in character," Mr. Schaub told NATIONAL PETROLEUM NEWS, pointing out that interstate operations are subject to the Interstate Commerce Commission's 60-hour work-week, which also allows 70-hours in 7 days for operators of trucks in 7-day service.

Several weeks ago Mr. Schaub and a group of other representative tank truckers in the state met with A. J. Maxwell, state Motor Vehicle Commissioner, and more-or-less voluntarily agreed to certain regulations to be promulgated by the state. It was the understanding at this time, truck men said, that the state regulations, which were to be applicable to intrastate movements, were to generally follow the ICC's regulations. (See N.P.N., Nov. 15, Page 23).

Follow ICC Rules

For the most part, the new state regulations (effective Dec. 15), do follow the ICC rules, plus some suggestions made by the truckers at the conference last month. However, the 55-hour work-week is shorter than that discussed and agreed upon by transporters, they said. Whether the truckers will go to court with their protest over the short work-week, or appeal it to the state government in some other way, has not yet been determined.

Aside from the 55-hour work-week, the hours section of the regulations provides that drivers shall not work more than 12 out of 14 days, nor more than 10 hours in any 12 hour period in one day, except in emergency cases, and makes the rules applicable to owner-drivers. The rules are applicable to private and for-hire transporters of petroleum products alike.

Other provisions in the regulations are for a 40 miles per hour speed limit for units with trailers, and 45 miles for straight trucks; for state-supervised inspection of vehicles; physicians' certificates of fitness for all drivers periodically (on prescribed forms); uniform accident reporting; drivers' logs, and other regulations.

At the time of the conference between Mr. Maxwell and the truckers, it was pointed out that the need for regulations covering intrastate petroleum haulers grew out of the fact that much of the movement by truck from Wilmington and Fayetteville water terminals is within the state, and not subject to Interstate Commerce Commission's safety rules.

Columbia River Barges Take Long Haul, ICC Lets Truckers Go After Short Haul

WASHINGTON, Dec. 11.—Columbia river barging operations have taken away much of the long-haul oil tonnage that formerly moved by truck into interior points of Idaho and Washington. Now, comes the Interstate Commerce Commission to authorize the truckers losing that tonnage to haul out of barge terminals at Umatilla, and The Dalles, Ore., and Attalia, Wash., on the Columbia river.

Operations on Columbia River are discussed in detail on Page 85 of this issue.

The petroleum transporters so authorized, in an ICC decision last week, were: Pacific Transport, Inc., Seattle; Inland Petroleum Transportation Co., Inc., Seattle; Dependable Tank Transport, Inc., Seattle; and Pacific Inland Transport Co., Portland, Ore. They will be allowed to haul from the new up-river terminals to the interior points in Idaho and Washington, formerly served by truck from Puget Sound and points further down the Columbia river than the new terminals.

The ICC brushed aside the point that these interior points were already adequately served by truck transports, saying, in the Dependable Tank Transport company case:

"Although several motor carriers were authorized to transport petroleum products from both The Dalles and Umatilla prior to the hearing in this case, and while there apparently is available ample service by motor vehicle from both points, such facts are not controlling in view of the circumstances herein."

ICC then held that its previous decisions denying other applications on the ground that there is already ample motor truck service were not applicable, since in the current case applicant "formerly transported to points in the territory involved, and that through no fault of its own it was faced with the possibility of losing a large percentage of its former business (because of competition from barges on Columbia river).

Hence the new up-river origin points were authorized for transportation to the points which the same truckers had formerly served from Puget Sound points, and from points further down the Columbia river.

S.F.A. Approves Cuts In Tennessee Rates

N. P. N. News Bureau

WASHINGTON, Dec. 11.—Southern Freight Association has approved and filed with Interstate Commerce Commission, probably this week, tariffs reducing rail rates on gasoline and fuel oil from Memphis and Nashville, Tenn., and the New Orleans-Baton Rouge Group to Tennessee points to meet truck and water competition.

The new rates are to be in line with the sharp cuts allowed by ICC a little more than a week ago (NPN, Dec. 6, P. 11), in which the rails were authorized to cut rates from New Orleans-Baton Rouge Group, Mobile, and El Dorado, Ark., to certain Tennessee River ports to meet water competition.

Representative of the proposed new rates are the following (in cents per gallon):

	From Memphis		From NO-BR Group	
To	"A"	"B"	"A"	"B"
Union City	1.39	1.09	2.18	1.88
Trenton	1.19	0.92	1.98	1.71
Humboldt	0.99	0.83	1.85	1.62
Jackson	0.99	0.83	1.85	1.62
Henderson	1.12	1.02	1.91	1.80
Selmer	1.19	0.92	1.98	1.71

"A" signifies present rates.
"B" signifies proposed rates.

Similar reductions are planned for fuel oil shipments.

Truck-Rail Damage Suit Postponed 'til January

WINSTON-SALEM, N. C., Dec. 11. — The treble-damage suit of Quality Oil Co. and its truck-transport subsidiary, Quality Oil Transport Co., charging four railroads with a conspiracy in violation of state anti-trust laws to eliminate truck competition, has been postponed until sometime after the holidays, according to Quality Oil's attorneys. (N.P.N., Oct. 11, p. 13).

Arizona Oil Case Threatens All Transporters, ICC Told

N. P. N. News Bureau

WASHINGTON, Dec. 11.—If Interstate Commerce Commission refuses to order railroads to raise their rates on petroleum products from California to Arizona it will set a precedent that will ultimately destroy truck transportation not only in that area, but throughout the U. S., the ICC was told by an attorney for California-Arizona for-hire transporters.

The attorney, Wallace L. Ware, former president of the California Railway Commission, was appearing here before ICC to argue against acceptance of the report of Examiner F. E. Mullen in the investigation into reasonableness of truck and rail rates in the California-Arizona movement. (N.P.N., Aug. 30, p. 20)

Mr. Mullen had recommended that the commission find the many-times-cut rail rates were compensatory, but that the truck rates, which were on a par with the rails, were below cost of operation, and added:

"To direct the low-cost agency (rails) in these circumstances to increase its rates would be to disregard the admonition of the Interstate Commerce Act."

Mr. Ware, in his argument, asked the ICC to approve an increase from 33 to 40 cents per 100 pounds (2.18 to 2.96 cents per gallon) for the Los Angeles-Phoenix haul, both by truck and by rail, with other rates increased commensurately.

The transporters' attorney compared transport tank trucks to a "lamb rampant in a den of lions," declaring that the rail rates (which at one time were as high as 90 cents to $1.09 per 100 pounds; 4.94 to 7.19 cents per gallon) had been steadily reduced in an effort to destroy truck competition. The present rates, around 33 cents, are the same for both, but are not compensatory to the trucks, he said.

Says Rail Figures 'Incorrect'

The attorney, who represented Ellington Bros., Ltd., Pacific Tank Lines, Lang Transportation Corp., Cantlay and Tanzola, Inc., Reliable Tank Service, and Capital Tank Lines, attacked the rail cost studies, under which their rates were found to be compensatory, as incorrect, adding that rates should be based on other factors than solely cost of service.

"All we've heard from the railroads," he said, "is 'let's destroy competition and then return to our inherent advantages and our inherent monopoly'—and that's all they're trying to do here." He declared no move was made by the rails to reduce their rates until trucks started cutting in on their oil tonnage, despite the fact that shippers had sought lower rates.

Mr. Ware told the Commission that "if we don't get compensatory rates we're dead. The Commission's opinion would then be a pattern to be followed throughout the U. S.—and we're killed twice." The truck attorney explained that not only would his particular group of truckers be injured by the decision in this case, but that truckers generally over the entire U. S., would suffer by the precedent so established.

James E. Lyons, San Francisco, appearing for the Southern Pacific Railroad, upheld the examiner's report, declaring that truck costs exceed rail costs by a considerable margin in this movement, and that was no reason for the rails to have to raise their rates. On questioning by Commissioner Rogers, Mr. Lyons said that he thought the only factor to be taken into consideration in rate establishment was cost of operation.

Gerald E. Duffy, appearing for the Santa Fe railway said that under a parity of rates the traffic will gravitate to the trucks, and was asked by Commissioner Caskie how he explained the fact, then, that since rates were at parity now, only about 30 per cent of the traffic was being carried by trucks.

Mr. Duffy said that the big truck lines are not soliciting the tonnage because present rates are not profitable, but that if the rates were increased, they would go after it.

A decision in the case is not expected for several weeks.

Canadian Oil Pipeline Moves 5,869,943 Barrels

OTTAWA — The throughput of Valley Pipe Line Co., Ltd., which operates a pipeline between the Turner Valley oil field and Calgary, Alberta, during the first ten months of this year was 5,869,943 barrels. October throughput was 682,044 barrels.

The company, formerly operated as a division of Royalite Co. and Imperial Oil, Ltd., has since the decision of the McGillwray Royal Commission in June operated as a common carrier. Effective as from June 15, the rates were set at 9.5 cents per barrel as against 15 cents formerly, and the charge for loading into trucks was reduced from 5 to 2.5 cents a barrel.

Nebraskan Gets OK To Transport From 'All Kansas Points'

WASHINGTON, Dec. 11. — Possibility that oil marketers may change their refinery source of supply is sufficient reason why a trucker who serves them should be granted authority to haul from all the potential refinery sources within an area, even though he is not hauling from all of them at the time application is granted, Interstate Commerce Commission has ruled in passing on the common carrier application of Ulrich Oil Co., West Point, Nebr.

Applicant sought authority to operate as a common carrier between all refinery points in Kansas and certain Northeastern Nebraska points. ICC held:

"The question is presented of whether applicant should be authorized to haul from all Kansas refining origins, or should be restricted to those from which consignees obtain petroleum. Some of them purchase from a refinery at more than one point; others do not. At any time, however, they may change from one point to another. In view of this circumstance and in order to satisfy the requirements of their patrons, applicant requests that it be authorized to serve each destination from any or all refining points involved. . . . The application is supported by oil dealers, who testified as to their need for applicant's proposed service and as to their satisfaction with his present service. We conclude therefore, that the granting of the common carrier authority sought . . . . would serve a useful public purpose and should be authorized."

If It Snows, He Can Use Other Routes, Says ICC

WASHINGTON, Dec. 11.—Interstate Commerce Commission has granted application of R. B. Wilson, Denver tank trucker, to extend his operations to include several mountain communities in Colorado which are not served by rail, and to add certain alternate routes because of the fact that routes presently authorized may be blocked by snow in winter time.

CLIP AND MAIL

OIL TRANSPORTERS . . MARKETERS . . REFINERY TRAFFIC MEN

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Oklahoma Rate To Be Similar To Kansas Cut

N. P. N. News Bureau

TULSA, Dec. 11.—Oklahoma Corporation Commission late last week vacated its order permitting a maximum 25 per cent cut in Oklahoma's intrastate petroleum rail rates. Refiners here expect this move will clear the way for a full 35 per cent cut in intrastate rail rates and remove cause for the proposed investigation of rates between Oklahoma, Kansas, Missouri and Arkansas by the Interstate Commerce Commission.

A scale of rail rates, calling for the full 35 per cent cut approved by the rails, and petitioned for by refiners, is expected to be published and made effective before the commission's order for the 25 per cent maximum cut is thrown out. Thus, Oklahoma's intrastate rates will be on a parity, it was said, with the Kansas intrastate scale and with rates between the three bordering states. Some refiners believe the new rail schedule will make rails competitive with trucks.

If the Commission allows the full 35 per cent cut, representing reductions of from 5 to 9.5 cents a hundredweight (0.330 to 0.627 cents a gallon on gasoline) it will return to the rails some of the tonnage lost to the trucks, it was said.

In the accompanying table is a comparison of "old rail rates" in effect prior to the Oklahoma Corporation Commission's order allowing a maximum 25 per cent cut; "present rates" as provided by the commission's order permitting a maximum 25 per cent cut; and "proposed rail rates" based on the mileage scale expected to be inaugurated in Oklahoma shortly. Mileage between points named is also given. Rates are in cents per gallon of gasoline shipped.

Oklahoma refiners contend the action by the Oklahoma commission removes cause for the ICC investigation, and early this week will ask that the investigation be dropped, according to reports. Truckers, however, may be expected to oppose this move, since it was believed that they may see in the investigation a way of forestalling loss of tonnage to railroads.

TULSA TO:	Mileage	Old Rate	Present Rate	Proposed Rate
Okmulgee	45	0.726	0.561	0.396
Vinita	65	0.858	0.660	0.462
Pryor	80	0.858	0.660	0.495
Oklahoma City	117	1.122	0.858	0.627
Ada	125	1.188	0.891	0.660
Ardmore	205	1.716	1.287	1.122

Virginia Tank Trucks Face City and State Control

RICHMOND, Va. — A double-barreled plan to regulate tank trucks will be pushed at the coming session of the Virginia Assembly opening here Jan. 10.

First it is proposed that cities and towns be permitted to prohibit, route and regulate the passage of tank trucks through their streets. The second proposition is that tank truck capacities be limited to 1500 gallons by state law.

Both proposals are being pressed as "safety" measures but there is more than a suspicion that the railroads are interested in obtaining this legislation.

Group Studies Trade Barriers

N. P. N. News Bureau

WASHINGTON, Dec. 11.—First undertaking of the federal interdepartmental committee on trade barrier legislation will be an analysis of state laws impeding the free flow of commerce between nine eastern and southern states, with the hope of completing the study before legislatures convene in some of these states next month.

States to be covered are Massachusetts, New York, New Jersey, Rhode Island, South Carolina, Virginia, Mississippi, Kentucky and Louisiana.

The committee also hopes to make a presentation, on effect of trade barriers, to the Temporary National Economic (Monopoly) Committee early next year.

Paul T. Truitt, Commerce Department, is chairman of the committee. Members include: Frank Bane, executive director of the council of state governments; Dr. W. Y. Elliot, Harvard University school of government; Professor F. Eugene Melder, Clarke University, department of economics; Dr. Willard Thorp, economic adviser to Secretary of Commerce Hopkins; and Richard V. Gilbert, chief of Commerce Department's industrial economics division. (Earlier story, N.P.N., Nov. 29, 1939).

Western Rails Slash Rates In Rocky Mountain States

N. P. N. News Bureau

WASHINGTON, Dec. 11. — Western railroads have filed within the past few weeks wholesale rail rate cuts on petroleum and products to meet motor truck competition in traffic moving between Wyoming, Colorado, Nebraska and nearby states, a check of recently-filed tariffs at Interstate Commerce Commission reveals.

Examples of the rate cuts are the reductions by several railroads in the rate on gasoline, kerosine and other refined products between Denver and Cheyenne—from 15 cents per 100 pounds (0.99 cent per gallon) to 11 cents per 100 pounds (0.73 cent per gallon).

Others are the cuts from Denver to Colorado points (filed by Colorado and Southern) as shown below (in cents per gallon):

To	New Rate	Old rate
Berthoud	0.36	0.43
Colo Springs	0.59	0.69
Greeley	0.43	0.50
Pueblo	0.86	1.16

Colorado and Southern likewise filed reduced rates from Cheyenne to Colorado points, typical of which are (in cents per gallon):

To	New rate	Old rate
Boulder	0.73	0.99
Longmont	0.53	0.76
McClellands	0.43	0.50

Union Pacific Cuts

Union Pacific has also published reduced rates in the area, chiefly from Parco, Wyo., to Wyoming, Nebraska, Colo., and Utah destinations, typical of which are the following:

To	New rate	Old rate
Hayden, Colo.	2.44	4.39
Sterling, Colo.	2.01	2.38
Denver, Colo.	1.52	2.18
Laramie, Wyo.	0.76	1.12
Medicine Bow, Wyo.	0.36	0.53
Provo, Utah	3.56	4.03
Big Springs, Neb.	2.38	2.64

Similar reductions have been published by U. P. in rates on heavier refined products from Parco to destinations in the states named, as well as from Cheyenne to Colorado stations, along with Colorado and Southern.

All the tariffs frankly state that the reduced rates are published to meet motor truck competition.

RAIL RATE BRIEFS

Illinois-to-Iowa Rates

WASHINGTON — Illinois Central has published reduced rates on gasoline and other refined products from Milan, Ill., to Iowa destinations. Examples are: to Rogers, Alburnett and Robins, 0.96 cents per gallon, cut from 0.99 cents; to Cedar Falls, 1.19 cents, cut from 1.25; to Manchester, 0.99, cut from 1.05; to Winthrop, 1.05, cut from 1.19; to Doris and Independence, 1.12, cut from 1.19, etc.

* * *

Crude to St. Elmo, Ill.

WASHINGTON — A sixth-section application to cut rates on crude oil from Griffin and Hovey, Ind., to St. Elmo, Ill., from 17 cents to 8 cents per 100 pounds (52.836 cents to 24.864 cents per barrel), has been filed with Interstate Commerce Commission by railroads represented by Agent Jones.

* * *

N.O.-B.R. Group to Kansas

WASHINGTON — Southwestern Freight Bureau has been asked by its rail-members to consider a reduction in rail rates on refined products from New Orleans-Baton Rouge Group to points in western Kansas and Oklahoma to a differential of 4 cents per 100 pounds (0.26 cents per gallon) above rates in effect from Port Arthur, Tex., to same destinations, and to make low-grade oil rates 80 per cent of proposed rates on refined oil to the same points.

New Mexico to Texas

WASHINGTON — Southwestern rails have published reduced rates on petroleum and products from Artesia, New Mexico, to Texas destinations to meet truck competition. Exemplary of the new rates are: to Allamore, 1.91 cents per gallon (for products moving at 6.6 pounds per gallon); to Barstow, 1.45 cents per gallon; to Odessa, 1.78 cents; to Van Horn, 1.88 cents, etc. Present class rates are considerably higher.

* *

Wyoming Crude to Pueblo

WASHINGTON — Colorado & Southern railway has asked Interstate Commerce Commission for authority to publish on one day's notice a rate of 14 cents per 100 pounds (43.512 cents per barrel) on crude oil from Cheyenne, Wyo., to Pueblo, Colo. Present rate is 45 cents per 100 pounds ($1.398 per barrel).

* * *

Truck-Compelled Rates to Detroit

WASHINGTON — To meet motor truck competition, New York Central has cut rail rates on petroleum and products from Caro and West Branch, Mich., to Detroit, to 9 and 10 cents per 100 pounds (0.59 and 0.63 cents per gallon), respectively. Present rates, on a class scale, are considerably higher.

* * *

Mississippi Rate Cut Hearing

ATLANTA — Rails propose in S.F.A. Docket 21021 to reduce rail rates on gasoline and kerosine moving from Vicksburg and Greenville, Miss., Memphis and the New Orleans-Baton Rouge refining area to Mississippi destinations to levels competitive with truck and truck-and-water transportation costs. The proposal will be heard at the Southern Freight Bureau offices here Dec. 18.

ICC Calendar On Oil Trucking

DECISIONS

R. B. Wilson, Denver, Colo. Certificate granted to operate as a common carrier of petroleum products in Wyoming and Colo., passing through Utah, over regular routes. (Docket No. MC 9895 Sub. 5)

Motor Oil and Gas Co., Pueblo, Colo. Application denied for a permit to operate as a common carrier of petroleum products in Kansas and Colo. (Docket No. MC 89695)

Ulrich Oil Co., West Point, Nebr. Certificate granted to operate as a common carrier of petroleum products from refining and distributing points in Kansas, to points in Nebr. (Docket No. MC 89213)

Dependable Tank Transport, Inc., Seattle, Wash. Certificate granted to operate as a common carrier of petroleum products from The Dalles and Umatilla, Ore., to points in Washington over irregular routes. (Docket No. MC 1004171 Sub. No. 1.)

Pacific Inland Transport Co., Portland, Ore. Certificate granted to operate as a common carrier of petroleum products from point in Ore. to points in Idaho and Washington, over irregular routes. (Docket No. MC 60306 Sub. No. 4).

Pacific Transport, Inc., Seattle, Wash. Certificate granted to operate as a common carrier of petroleum products from The Dalles and Umatilla, Ore., to points in Wash. over irregular routes. (Docket No. MC 89693 Sub. No. 1.)

Inland Petroleum Transportation Co., Inc., Seattle Wash. Certificate granted to operate as a common carrier of petroleum products from The Dalles and Umatilla, Ore., to points in Wash. over irregular routes. (Docket No. MC 88161 Sub. No. 2)

HEARINGS

Northland Petroleum Transport Co., Lancaster, Pa. Dec. 18, Brooklyn, on application to extend operations as a contract carrier of petroleum products in Pa. and N.Y. over irregular routes. (Docket No. MC 86188 Sub. No. 5)

Clark Oil Co., Inc., Danville, Va. Dec. 19, Roanoke, on application to extend operations as a contract carrier of petroleum products in Va. and N.C. (Docket No. MC 5727 Sub. No. 2)

Build 22 Tankers

N. P. N. News Bureau

WASHINGTON, Dec. 11. — Twenty-two oil tankers were under construction in U. S. yards on Dec. 1, American Bureau of Shipping reports, compared with 17 reported under construction last year at this time. The tankers, 18 of which are steam-powered, range from 5200 to 11,500 tons, and 11 of them are being constructed for Standard Oil Co. of New Jersey. Other companies which have contracted for one or more tankers are Union Oil Co. of California, Socony-Vacuum Oil Co., Texas Co., Standard Oil Co. of Calif., Atlantic Refining Co., Sun Oil Co., and National Bulk Carriers, Inc.

At the same time the Bureau reported that 23 oil barges are being constructed in United States yards.

Group 3 rail freight rates to representative mid-western points appear on Page 99.

36,750,483 Barrels "Exchanged"

WASHINGTON — Seventeen major oil companies received a total of 36,750,483 barrels of gasoline on an exchange basis n 1937, according to a statement filed with Temporary National Economic (Monopoly) Committee.

Truckers to Confer On Sizes, Weights With War Planners

By Teletype

N. P. N. News Bureau

WASHINGTON, Dec. 12.—Charles P. Clark of Columbia terminals, St. Louis, chairman of American Trucking Association's size-and-weight committee, is in Washington and will call at the War Department this week to discuss with high army officers the Army's ideas for making uniform the truck size and weight limitations over the entire nation, thus doing way with the hodge-podge of widely varying statutes now on the states' law books. (NPN, Nov. 29, p. 14).

Following his conferences at the War Department, Mr. Clark will talk to heads of different special commodity-hauling groups in the trucking industry. Important among these is the petroleum haulers' division of the A.T.A., headed by Morris L. Wilcox, Downingtown, Pa., since it is understood that the War Department is particularly interested in the size of trucks which would, in time of emergency, supply its mechanized forces.

A.T.A. has been interested in uniformity of truck size-and-weight limitations since its organization.

C.F.A. Rates on Longer Hauls To Be Published Soon

CHICAGO, Dec. 11. — The Central Freight Assn. is expected to publish a tariff within the next 10 days on docket number D-37001 basing rail rates on petroleum products moving within C F A territory, west of the Ohio River, on a 29 cent per loaded truck mile (4200 gallon) over distances exceeding 131 miles up to and including 236 miles, according to an announcement by Mr. Eugene Morris, C F A chairman.

The C F A executive committee approved the above docket last October 23. Similar rate reductions on distances below 131 miles in C F A territory were put into effect last August 20.

Allies' Tanker Fleet Welcomed to the Gulf

(*Continued from page* 17)

"had their share" of the boats observers said.

Movements Kept Secret

While the utmost secrecy veiled movements of the boats, a check at one port indicated a total of approximately 814,000 barrels of petroleum, including natural gasoline and crude, worth over a million and a half dollars, had been loaded into the boats.

Those freighters which accompanied the fleet were said to have been sent over to pick up several thousand barrels of lubes which Mid-Continent refiners had sold the French and English. While packaged lubes have been moving out more freely than tanker lots of refined oils, there has been some piling up of supplies at Gulf ports, according to reports. Refiners hesitate at revealing details as to movement of lubes, but it was believed at least one part cargo of lubes, in addition to the drum movements by freighter, would accompany the fleet on its return trip.

So the fleet that set out for Europe will have an almost 100 per cent cargo of oil.

One interesting development in this war demand for oil is the preference of ship owners for crude cargoes. While British and French ships have been virtually conscripted by their Governments, apparently the owners have voiced their preferences for crude cargoes over gasoline. This has been reflected in the preponderance of crude cargoes.

New York Discounts Tanker Fleet Report

N. P. N. News Bureau

NEW YORK, Dec. 12.—Some oil export managers today were inclined to discount reports that 35 British and French vessels, "mostly tankers", had arrived at the American Gulf, expressing the opinion that this reported total was too large, although admitting that a "number" of Allied tankers had arrived in the past week.

A report from California that "70 to 90" cargoes had moved out of Venezuela in one week was also discounted by export men here. One said that current Venezuelan exports were not more than "normal."

Motor Vehicle Sales Up 45%

NEW YORK, Dec. 11.—Factory sales of passenger cars and trucks for the eleven month period ending Nov. 30, of 3,259,078 units, were 45 per cent higher than for the similar period in 1938, according to an estimate of the Automobile Manufacturers Ass'n.

November sales totaled 365,900 units, an increase of 13 per cent over October, the association estimated. However, sales in November were 6.2 per cent below November, 1938.

93,000,000 Bbls. Seen For Illinois in 1939

SPRINGFIELD, Ill., Dec. 11.—Total 1939 crude oil production in Illinois will reach 93,000,000 barrels, according to an estimate by the Illinois Geological Survey. Production for November was placed at 9,888,000 barrels, making a total of 82,869,000 barrels for the eleven months. Illinois crude output in 1937 was 7,499,000 barrels and in 1938, 24,075,000 barrels.

Estimated 329,600 barrels daily production for Illinois for November is slightly lower than the 330,129 barrels produced on daily average during October of this year.

During November 284 producing oil wells and two gas wells were brought in, making a total of 4798 producing wells in the 50 oil fields in Illinois which have been opened since the first of 1937, the Survey's report reveals. Drilling operations were in progress in 44 counties on Dec. 1 of this year.

Georgia Tax Receipts Up 7%

ATLANTA, Ga. — Gasoline tax collections for November totaled $1,809,935 in Georgia, which brings the 11-month total to $19,259,949. This sum represents a 7 per cent increase when compared with Jan.-Nov. collections in 1938, amounting to $17,971,278. Georgia's tax is 6 cents per gallon.

Nebraska Marketers Draft 1940 Program

By NPN Staff Writer

OMAHA, Dec. 9. — Nebraska petroleum marketers' program for 1940 will be finalized at a meeting of the directors at Grand Island, Nebr., on Dec. 18 or 19, it was decided at the annual convention here Dec. 5-7 of Nebraska Petroleum Marketers, Inc.

Karl Swanson, Gothenburg, of Swanson Oil Co., is chairman of the planning committee which will report at the Grand Island meeting. Included in next year's program will be a drive for members and greater participation in association activities.

The association started the new year by re-electing the president, Paul H. Engler, Bassett, of the Rock County Oil Co. The other officers are new, with Leroy L. Snyder, Blair, of Nebraska-Iowa Oil Co., first vice-president, and Senator Tom L. Lambert, Columbus, of Randall Oil Co., second vice-president.

Terms of two directors expired and new members were elected. They are Keith Rosenberg, Lexington, of Rosenberg Bros. Oil Co., and O. J. Shaw, Lincoln, of the Shaw Oil Co.

Mayor Dan Butler welcomed the oil men to Omaha and the formal program started. Hoyt Ogram, Chicago, of Kanotex Refining Co., made a plea for independent marketers to assume leadership on a platform of improving marketing practices.

Program for Independents Urged

Planks suggested by Mr. Ogram were an accident prevention program, a study of disposal of oil drainings, standards for zoning laws and for domestic oil burner tank installations, and sanitary rules for stations.

"These are just a few things that come to mind that you independent jobbers could do to assert your leadership," he said. "A program with just a few such items would prevent first, unwanted politically-made laws and, second, it would lead to a program of standardized marketing rules that would stop the ruthless barbarism and piracy that destroys and crucifies so many of us today."

Major companies in attempting such a program "would immediately create scrutiny, suspicion and investigation from every political agency in the land," Mr. Ogram said. "So the door of opportunity is wide open for independent jobber leadership to recreate, let us say, civilization in the oil industry." Major company employes, he continued, are human—trying to get along, and they would follow independent marketers, if they were organized under real leadership. "Certainly to the major executive, independent leadership is far better than political suppression and supervision," he added.

The Ohio Petroleum Marketers Ass'n. and the Independent Petroleum Ass'n. of America were praised by Mr. Ogram for assuming leadership in their fields.

Denny Moore Talks

"Widening the profit horizon," is one answer to the industry's position in marketing, G. Denny Moore, of New York, president of the Gasoline Pump Manufacturers Ass'n., told the convention, with petroleum accounting for 11 per cent of all retail sales yet having 18.5 per cent of the employes and 19 per cent of the pay roll.

The station cannot depend entirely on gasoline and oil, he said, and pointing out that some marketers are striving for a balance of 50 per cent gross profits from gasoline and 50 per cent from lubrication, accessories and services. The marketer is a highly important factor as the supplier of about 60 per cent of the dealers, he added.

Marketers were urged to study seasonal needs of their community, the lines of merchandise that can be sold, to display their goods, and train salesmen to be alert to opportunities. One of the best money making departments, he continued, "is a well equipped lubrication bay," pointing out the lubrication market is only one-third developed.

The 20 square feet at the gasoline pump island is the most valuable business real estate in the country, Mr. Moore said. About 80 per cent of the pumps now in service are not modern, he said, and many are obsolete. The gasoline pump was called the "pacemaker of the station."

Modernization of the station need not be prohibitive in cost, he said, as financing can be through earnings or by a financing agency.

Warren C. Platt, Cleveland, publisher and editor of NATIONAL PETROLEUM NEWS, discussed the industry's changing transportation system. Nebraska marketers were reminded that if the state's budding oil boom blossoms into a big field there will be the inevitable struggle over enacting a conservation law, with products from Nebraska crude seeking a market in competition with established sources of supply.

Arthur F. Johnson, Kansas City, Ethyl Gasoline Corp. fleet engineer, cited results from higher compression engines in trucks hauling loads faster than low compression engines with greater fuel economy. The time factor, he told the convention, is more important now since federal regulation of driver's hours.

May Buy Octane-Test Machine

John Ainlay, chief of the new state division of motor fuels established by the recent legislature, told how his department operates now that it is a separate division, with eight inspectors in the field on petroleum products alone while the old division included inspection of some 35 other industries. Inspectors now carry equipment to make a flash test on kerosine in the field. The division is considering purchase of an octane testing machine, Mr. Ainlay announced.

Judge Walter E. Brown, Kansas City, chairman of the American Petroleum Industries Committee in Kansas, reminded marketers the public is not close to producing or refining, but does meet the marketer who represents the industry. Judge Brown spoke against restrictive legislation, noting that "no man ever legislated a competitor out of business who did not live to regret it."

H. A. Inness Brown, of New York, publisher of the Gasoline Retailer, spoke for a better public acceptance of the industry, which he declared was "probably at its lowest ebb" now, and urged oil men to talk for the industry if it is to be kept a free, American enterprise. The industry faces a definite crisis now in the Cole federal oil bill because the measure, he said, is being passed without consultation with the industry and is not demanded by the public.

Oil needs an organized method of expressing the opinion of the industry as a whole to legislative bodies, he continued. One suggestion he offered was to "build a solidarity in our industry, a trust in it, a pride in it," with principles on which the whole industry can unite on a platform, the first plank to be free enterprise in a free America.

Re-elected

Paul H. Engler

DEATHS

So widespread is the oil industry that many friends are separated for years. NPN would like friends and relatives of any deceased oil man to send in notice of his passing for publication.

William E. Callaghan

William E. Callaghan, 63, Jackson, Mich., president of Motor State Oil & Grease Co., died suddenly Dec. 6 at Battle Creek, Mich., while on a business trip. He entered the oil business in 1904. Two of his brothers surviving, Andrew J. Callaghan, Chicago, vice-president of American Oil & Grease Co., and Paul W. Callaghan, Jackson, Mich., of Paul Callaghan Sales Co., are oil men. He leaves also a widow, Mrs. Rose Callaghan, four children, a brother, John P. Callaghan, Detroit, and sister, Mrs. William M. Normile, Cleveland.

Luther Miller

Luther Miller, 81, veteran oil man and native of Beaver, O., who grew up in the Pennsylvania Grade regions, then migrated to Tulsa years ago, died Dec. 4 at Columbiana, O.

Harry Staton

Harry Staton, of Cushing, Okla., vice president of the Oil Workers International Union, died suddenly while in Toledo on organizational work, C.I.O. headquarters in Washington reports. Funeral was held Nov. 28 at Coffeyville, Kans.

Wage Hour Officials Reach for Marketers

N. P. N. News Bureau

WASHINGTON, Dec. 11.—Wage-Hour Division has given further indication that it regards oil marketers, receiving their supplies from outside the state, as coming under the federal wage-hour law even though their deliveries are made entirely within the state.

So far, however, wage-hour officials have not ruled specifically on the status of oil marketers—at least no such ruling has come to light in the 14 months that the law has been operating. Several weeks ago, the Wage-Hour Division issued a pamphlet wherein it was stated that "a wholesaler who either receives goods from outside the state or sells them across state lines" is under the federal law (See N. P. N., Nov. 29, page 9).

This statement about wholesalers prompted an oil attorney (who does not wish his name mentioned) to come to Washington and inquire how this ruling applied to oil marketers who are among his clients.

'Stream' Theory Cited

He told NATIONAL PETROLEUM NEWS that wage-hour attorneys with whom he talked indicated their belief that the "stream of commerce" theory applied to the oil industry—that is, marketing was part of the "stream" which began at the wells, flowed through refineries, transportation agencies, bulk plants, trucks and filling stations to the consumer's automobile tank. Even filling stations would be part of the "stream"—and so subject to federal regulation—except that the wage-hour law specifically exempts local retailing, according to the wage-hour officials.

Specific exemption for retailing, with no mention of wholesaling, is regarded by the wage-hour officials as meaning that Congress intended that wholesaling should be included under the federal wage-hour law, the oil attorney said.

Asked what employes of a wholesaler the wage-hour division regarded as under the Act, the government men said "all engaged in a wholesaling function," which would apparently include all workers around bulk plants, clerical help and others except for those coming within the exempted class of administrative and professional employes, outside salesmen, and those engaged in local retailing, according to the oil attorney.

Private Truck Drivers Held Subject to 42-Hour Maximum

The wage-hour division, he reported, considers drivers for private carriers (oil companies and others hauling their own products in their own trucks) as under the maximum hours provision (as well as the wages section) of the wage-hour law, until the ICC decides on whether or not it will exercise jurisdiction over private carriers and prescribe maximum hours as part of its safety regulations under the Motor Carrier Act. ICC has under way now an investigation to determine whether there is "need" for so regulating private carriers. If no "need" is found, for regulating the private carriers as to hours, then the wage-hour division would continue to exercise its control. If the "need" is found and the ICC takes jurisdiction, then the ICC hours-of-service rules would prevail instead of those of the Wage-Hour Division, it was said.

Some representatives of private carriers would prefer to be under the Wage-Hour Division—even though its work-week is 42 hours—rather than come under the ICC's 60-hour week which might entail other regulations, too, such as drivers' logs, reports, etc.

Drivers as 'Outside Salesmen'

While the Wage-Hour Division is reaching after control of drivers of privately-owned trucks (private carriers), this oil attorney got the impression that many tankwagon drivers would be considered "outside salesmen" and hence exempt under terms of the wage-hour law itself. Usually, there is a distinction between a driver of a transport truck and tank-

Please Report Your Gains in Sales of WINTER-CHANGE-Over Jobs This November

NATIONAL PETROLEUM NEWS wants to publish as soon as possible, the story of how good a job all men in oil marketing have done in this year's Winter Change-Over campaign.

"NPN" wishes to publish the name and address of every oil marketer, every company division manager, district manager, or agent, and super service stations, who reports substantial increases in this year's sales over last year, of the LUBRICATING JOBS, the Complete Winter Change-Overs, and the sales of tires, batteries and other accessories sold as a part of the change for winter. These names will be listed according to whether the increase is 25%, 50% or 100%.

Please give the per cent of your increase, divided if possible according to the character of Change-Over service sold, that is No. 1—lubricating, transmission and differential jobs; No. 2—anti-freeze; No. 3—new tires; No. 4—new batteries and No. 5—any other winter accessories.

Figure this increase for November of this year (1939) against your sales for similar goods and services in November of last year (1938).

Please address your report to the

Winter Change-Over Editor
National Petroleum News
Penton Building, Cleveland, O.

wagon driver—the latter was not hired to haul gasoline but to sell and his "hauling" is only incidental to his distributing the products, with his pay generally based on commissions, the attorney pointed out.

The oil attorney cited to the wage-hour officials the U. S. Supreme Court ruling in *Atlantic Coast Line Railroad Co. vs. Standard Oil Co.* (275 *U. S.* 257; 72 *Law Edition* 270) wherein the court held that shipments received in Florida marine terminals by tanker from the Gulf were not in "interstate commerce" after they had been placed in bulk storage, and that shipments within the state from these terminals was *not* a continuation of the interstate movement by tanker but purely local and subject to intrastate freight rates.

Applies Florida Decision

In the light of this decision (which has never been reversed or modified by the supreme court, he said), the oil attorney told the wage-hour officials that he was at a loss to see how the Wage-Hour Division could hold that a local oil marketer was subject to the law, except possibly as regards those employes actually engaged in unloading the tank car or truck transport which had hauled in the supplies from a shipping point outside the state. From that point on, the oil attorney said, the supreme court's decision in the Florida case seemed to make the marketer's operations entirely an intrastate matter, not subject to federal regulation.

He also called attention to the Wage-Hour Division's ruling that where a manufacturer purchases his materials from outside the state and processes them into an article which is sold entirely within the state, his employes are not subject to the federal law.

Says Length of Time Involved

By analogy, he continued, it would seem that a marketer who blends his gasoline with benzol, natural gasoline or other additive would not be subject to the law either. This led one of the wage-hour lawyers to remark that perhaps the length of time that the gasoline remained in the bulk storage tanks might have some bearing on whether or not the "stream of commerce" was sufficiently interrupted to make subsequent operations intrastate.

The oil attorney pointed out, however, that there was no mention of the "stream of commerce" theory in the wage-hour law nor any indication that Congress had in mind that it would be applied in administering the law. On the contrary, he added, the law applies only to commerce specifically defined to mean "trade or transportation among the several states or from any state to any place outside thereof." He said that he did not believe, in view of the Florida decision, that the Supreme Court would uphold the view that oil marketers whose tank trucks do not cross state lines were subject to federal regulation.

Although the wage-hour officials may have contended for the "stream of commerce" theory strongly in their conversation with the oil attorney, nevertheless there are some grounds for believing that the Wage-Hour Division's legal staff is not any too certain of the theory's validity, as applied to oil marketers.

Held Same View 15 Months Ago

As long as 15 months ago (See N. P. N., Sept. 28, 1938, pages 35-40), high-ranking officials of the Wage-Hour Division indicated their opinion, informally, that oil marketers, as wholesalers were under the law—yet so far they have not issued any interpretation to that effect.

Principal worry of the wage-hour law for employers generally has not been the minimum wage (30 cents an hour until Oct. 24, 1940) nor of the 42 hour provision, but the requirement that each hour of "overtime" must be paid for at the rate of time-and-a-half of the employe's *regular* rate of pay, even though his wage scale be several times higher than the 30-cent minimum. This requirement has penalized employers with high wages, especially those in communities where the prevailing work week on farms, in stores and other establishments is somewhat more than 42 hours.

Wage-Hour Law Bars Minors As Drivers or Helpers

N. P. N. News Bureau

WASHINGTON, Dec. 11.—Children's Bureau of the Department of Labor has ruled that the occupations of motor vehicle driver and helper are "particularly hazardous for the employment of minors between 16 and 18 years of age" and has issued an order prohibiting such employment under the Wage-Hour Law.

Virginia Tax Receipts Rise

RICHMOND, Va. — October gasoline tax collections in Virginia amounted to $1,627,101, according to the Virginia Division of Motor Vehicles, about 4 per cent above sum collected last October, and bringing the 10-month total to $15,929,398, more than 7.8 per cent above collections during same period last year amounting to $14,773,102. Virginia's tax is 5 cents per gallon.

'Premium' at 'Regular Price' To be Marketed by Jersey

N. P. N. News Bureau

NEW YORK, Dec. 12.—Two new gasolines, including a "premium" grade at "regular price," will be placed on the market Dec. 12 by Esso Marketers, subsidiary of the Standard Oil Co. of New Jersey, according to a company announcement.

One of the gasolines will replace "ESSOLENE," the company's house-brand regular, and will be branded "NEW ESSO" (the company's "premium" grade up to now has been branded "ESSO"). The announcement said that "NEW ESSO" marks "the first time a regular-priced gasoline has met accepted specifications for premium gasolines."

The new "ESSO EXTRA," the announcement added, "has been brought to new high anti-knock levels, being based on the performance requirements of Fighting Grade aviation gasoline."

"It has become necessary," the announcement said, "to use new and superior motor fuels to permit the modern motor car to function at maximum efficiency. Today's automobiles have an average compression ratio 28 per cent greater than the cars of six years ago. In addition, average engine speeds are up 21 per cent and average power developed has jumped 38 per cent in the same period."

Declines To Reveal Octane

Company officials declined to give out the octane ratings of the two new gasolines. One official said both gasolines contain tetraethyl lead.

A newspaper advertisement, Dec. 7, said "NEW ESSO" was "a new regular-priced gasoline that meets specifications for premium anti-knock performance."

A "premium" motor fuel containing tetraethyl lead, according to present contracts of Ethyl Gasoline Corp., must have a minimum octane rating of 78 (L-3 method, which for most gasolines generally runs about 2 octane numbers higher than the same gasoline tested by the A.S.T.M. motor method).

Specifications for "ESSO" and "ESSOLENE" as of April 28, 1939, were filed with the Temporary National Economic (Monopoly) Committee by the New Jersey Standard and its subsidiaries marketing the same brands, Colonial Beacon (New England), Louisiana Standard (Arkansas, Louisiana and Tennessee), and the Pennsylvania Standard. They showed A.S.T.M. octane ratings of 80.5 for "ESSO" and 74.0-74.5 for "ESSOLENE" as of that date last spring.

Ickes Accepts Wilson's Defi

N. P. N. News Bureau

WASHINGTON, Dec. 11.—Interior Secretary Ickes would welcome a "showdown" in his controversy with Federal Judge James C. Wilson over the latter's acceptance of *nolo contendere* pleas and dismissal of certain counts in a "hot oil" indictment in Texas a little more than a week ago, he told newspapermen at a recent press conference. (N.P.N., Dec. 6, p. 5).

The Secretary said he had sent for a complete record in the case, and would study it. Earlier, on learning of the dismissals and acceptance of pleas in the cases of Renne Allred and Neal Powers, Ickes had charged that Judge Wilson's action "seriously handicaps" administration of the Connally Act. The Judge replied with a statement that Secretary Ickes' attack on the judiciary was unjustified, and that he would seek a "showdown," either before the President or before Congress.

On being asked about this, Ickes replied:

"A showdown might determine why it's such a hopeless task to enforce the Connally Act in Texas in any real sense. The government indicts, comes in with proof of violation, and then the defendants get a slap on the wrist."

Asserting that the courts have failed to co-operate, Mr. Ickes said "there are only two ways to stop the sale of 'hot oil,' and they are jail sentences and fines of such size as to make it unprofitable to run 'hot' oil."

Grand Jury to Probe Into Patent Pooling

N. P. N. News Bureau

WASHINGTON, Dec. 11.—A federal grand jury will be impaneled in U.S. District Court for Southern New York, New York City, sometime before Christmas to conduct an investigation "of the use of patents, patent pooling agreements and patent licensing agreements by which certain industries in the United States are controlled and dominated by one or several large companies."

Although the Justice Department has made public none of the "certain industries" which will be investigated in its probe of alleged patent misuse "to evade the federal anti-trust laws," it is known that department has had certain gasoline "cracking" patents, as well as those for allied processes, under surveillance for more than a year.

Arnold Quoted

"As a result of the grand jury inquiry," Anti-trust chief Thurman Arnold said in announcing it today, "it is expected that a series of proceedings against companies and persons in different industries will be commenced in which there will be raised every type of practice under the patent law that the department considers contrary to the policy of the anti-trust laws and in violation of such laws.

"The grand jury . . . will investigate the extent to which patent rights are improperly utilized to control various industries and to prevent free play of competitive forces in the market.

"The facts now in possession of the department indicate that patent rights have been used to divide fields into non-competitive spheres, establish price-fixing schemes, divide markets into exclusive geographical areas, limit production and quality, restrict the use of products, require that outsiders purchase non-patented materials and service, enforce tying-in provisions, prevent the investment of new capital in industry, and in general to restrain trade and eliminate competition . . .

"By reason of these practices, arbitrary and artificially high and rigid prices have been and are currently being maintained in certain industries. Such non-competitive prices frequently relate to articles that are widely distributed to, and in daily use by, the purchasing public.

"The necessity for clarification of the line at which proper usages of patent rights end, and monopolies and combinations in restraint of trade in violation of the anti-trust laws begin, has become imperative as methods of production have become more complex. Certain industries in fact revolve their entire manufacturing and distribution function around patented processes and devices. Other industries have either grown around or become integrated through a single patent holding company, not in the business of manufacturing and distributing, but created and operated solely for the purpose of enforcing licensing restrictions."

Interprets Patent Laws

Then, interpreting the patent laws in his own light, Mr. Arnold declared:

"The Constitution does not grant to Congress a general power to issue patents. Congress is given the power to grant the patent privilege 'to promote the progress of science and useful arts' and the legislation authorizing the issuance of patents is the mere instrument through which the constitutional purpose is reached. The department believes that the abuses of patent rights frustrate this constitutional purpose, have no legal sanction, and run counter to the policy of the anti-trust laws."

He hastened to point out that he has no quarrel with the patent laws and the constitutional provision under which they were enacted, but added: "However, it is the function of the anti-trust laws to see that legal privileges, such as patents, are not used as a cloak to enforce unreasonable restraints of interstate commerce. . . . if the patent owner seeks to restrain and control trade in violation of the fundamental policy of the anti-trust laws, then it becomes the government's responsibility legally to end such practices."

Christmas Closing Urged

CLEVELAND, Dec. 11. — Cleveland Ass'n. of Petroleum Retailers is backing a drive for all dealers to close their stations all day Christmas.

OIL TAX NEWS

TAXES are so important to ALL oil men, especially taxes levied directly on the oil industry and its products, that N. P. N. each week will devote these columns to news on the subject. Association secretaries, tax committees, other groups and oil men generally are invited to send in news items about taxes—tax proposals, meetings, resolutions, tax bill hearings, rulings, etc. Address Oil Tax News Editor, National Petroleum News, Cleveland, O.

Virginia 'Tax on a Tax' Case Pressed for Early Decision

N. P. N. News Bureau

RICHMOND, Va., Dec. 11.—Ira E. Walton, head of Roanoke Oil Co., will seek to get a court ruling before the end of January as to whether he (and many other oil jobbers and distributors in Virginia) must pay the state, as a part of his merchants' license fee, a percentage not only of his actual sales, but of the money he collects for the federal government as gasoline tax in making these sales.

Judge Gunn, of the Virginia Circuit Court, who heard testimony in the case here last week, has ordered briefs to be filed in the case. The state's brief, contending that it is entitled to assess its merchants' license tax fee against total sale price of gasoline instead of the price ex-tax, is due by January 15, and Mr. Walton has instructed his attorneys to file their reply brief as soon afterward as possible (although it is not due until Feb. 1). Reason for the haste is that the merchants' license tax for 1940, based on 1939 sales, is due to be paid in January, and if he is able to get a court ruling before the end of the month, he will be certain as to the amount which he has to pay.

Affects Many Marketers

Walton's attorneys will argue in their brief that the merchants' license tax, if made to cover the federal gasoline tax collections, is a "tax on a tax" and therefore illegal. He is represented by Paul S. Johnson and A. L. Hughson, both of Roanoke.

Determination of the legality of the method of computing the merchants' tax will affect almost every other jobber and distributor in the state—some of whom have, and some of whom have not, been paying on the basis prescribed by the state tax officials in the Walton suit. For those who have not, it will mean either that they have no more worry about it or that they will be subject to paying "back" taxes; for those who have, it will mean either that they will be entitled to refunds, or nothing.

Because of its statewide importance, the Virginia Petroleum Jobbers Ass'n. last fall voted to aid in costs of litigating the suit.

Following last week's hearings, Mr. Walton said he was pleased and encouraged at the progress so far. The State only produced one witness, and the defense put three witnesses on the stand in opposition to the "tax on a tax."

'Gas' Tax Hike Move In D.C. Predicted

WASHINGTON — A determined effort to raise the District of Columbia gasoline tax from two cents to three or four cents is expected at the coming session of Congress (which makes all the local laws here). Several citizens' associations have gone on record as favoring a "gas" tax increase in exchange for repeal of the D. C. income tax law enacted last session.

Local oil men are rallying to fight the proposal, pointing out that increasing the tax rate would probably mean greatly reduced gallonage and that total receipts would be little, if any, larger. Virginia has a 5-cent state tax and Maryland, 4 cents, as against 2 cents here

'National Defense' Roads Studied— To Be Paid for Out of 'Gas' Tax?

N. P. N. News Bureau

WASHINGTON, Dec. 9. — Public Roads Administration officials and representatives of the War Department are making a survey of the nation's highway needs from a national defense standpoint.

When it is completed, the two agencies will have comprehensive information on the condition and location of 50,000 miles of "strategic" military highways—existing highways which might become of military importance in an emergency—throughout the nation.

Of interest to the oil industry, is the possibility that "national defense" needs may be found to require the building of access roads to military points and other highways, not needed in peacetime, which would be paid for out of gasoline taxes.

The government survey is using some of the data which has been gathered (but not yet published) by the state highway surveys, which have been under way for the past three or four years, and when the study is over, it is expected the Army will be able to tell roads officials—state and federal—exactly what improvements are necessary on the roads which might become vital to national defense.

Need for the survey grows out of the rapid mechanization of the Army, whose officials estimate that a division which used to be able to move 20 miles a day, in good going, now may cover 16 times this much ground in a 14 hour period.

Military Roads Not Included

However, it is not planned to construct any system of purely "military" highways, such as exist in some European countries, but instead to utilize existing highways, in some cases reconstructing them over a period of years to eliminate sharp curves, low-clearance overpasses, steep grades, etc.

While both government agencies decline to discuss the study in detail, it is understood its findings thus far have indicated that the 26,000-mile "inter-regional" system recommended by the Bureau of Public Roads (now the Public Roads Administration) early this year (N.P.N., May 3, 1939, p. 30) will serve as a nucleus for the 50,000-mile "strategic" net ultimately to be built up.

Indications are that the Bureau plans to take military needs into consideration in approving future federal-aid programs of the states, and programs which contemplate improving the "strategic" highways probably will be favored.

Possibility that the "inter-regional" system (which, the Bureau said, would carry some 12.5 per cent of the total annual civil vehicle mileage) has some military significance at the time of its recommendation is seen in utterances of War Department officials. Lt. Col. P. E. Tombaugh of the War Plans Division revealed in an address before the National Ass'n. of State Highway officials at Richmond, Va., last month that the War Department has kept up to date a so-called "Pershing Map," showing highways of strategic importance, and that the last revision of this map was presented to the Public Roads Bureau this year.

Fits In with Bureau's Plans

However, federal road officials protest that there is no particular significance in the current study; that for the most part highway work as suggested by the War Department fits in perfectly with the Bureau's plans for construction of highways to benefit the nation's peace-time traffic, and that the highways essential for national defense are really not "military roads."

But, to quote from Col. Tombaugh's speech: ". . . the primary purpose of the Special Highway map is to provide your state highway departments and the Public Roads Administration with information concerning important strategic roads. It is hoped, in the interest of National Defense, that the general routes indicated and the standards of construction desired, will receive favorable consideration in your highway development program. . . It is understood that the Public Roads Administration is now conducting a survey to obtain information regarding the existing deficiencies of these important roads."

Army Wants "Access" Roads

Just how these "strategic" roads are to be built, and with whose money, is unrevealed. For the most part they are the highways which the average motorist travels, but, Col. Tombaugh's speech continues:

"For convenience, roads which are needed in the vicinity of military posts and proposed concentration centers are called access roads. In many instances these are inadequate in number and far below the standards that would be needed in the event of an emergency. . . . . The War Department recommends that the state highway authorities and the Public Roads Administration give consideration at this time to the construction of these essential access roads."

No indication of how much these access roads would be used by the average civilian motorist is given, although he may be asked to pay for them, through gasoline taxes or otherwise, unless some special provision is made for financing such roads.

Even more important, however is the question of financing the proposed 26,000-mile highway system proposed last May, which, it is claimed would carry 12.5 per cent of actual vehicle mileage. There might be a combination of "toll" financing and gasoline tax financing.

Ties In With Truck Study

Although there is no comment to be elicited, there is some talk here that the Interstate Commerce Commission's findings as to travel-resistance of existing roads, as well as their curves and grades, in connection with the commission's study of the "need" for federal truck size and weight regulation (N.P.N., Nov. 22, p. 19) may also be usable by the Bureau of Public Roads and the War Department in their joint study of national defense highways.

In his speech at Richmond, Col. Tombaugh laid down the "standards of construction" desired by the War Department on military highways, naming type of surface, load capacity, extent of grades and curvature, as well as "sight distance," and concluded:

Summarizes War Road Needs

"To summarize, from the military viewpoint:

"First, existing deficiencies in the strategic system should be eliminated.

"Second, insofar as practicable and consistent with commercial needs, projects for construction of essential access roads deserve favorable consideration.

"Third, highway facilities in important industrial areas should be adequate to meet the highway and traffic requirements of wartime industrial procurement.

"In these uncertain days, when our national security assumes increasing significance, I am sure that each of you . . . wishes to contribute his full share toward our national defense. All of us . . . are working toward a common end, that is to insure the security of America against any emergency that may arise. In working toward that common end, each one of us is contributing materially to our national defense."

Report Talks Of Road Plan

N. P. N. News Bureau

WASHINGTON, Dec. 11.— Bureau of Public Roads makes only brief reference in its annual report, out today, to the survey it is conducting, with the War Department, into national defense highways, although it discusses at some length its "interregional" highway plan, submitted to Congress by the President early this year.

"A system of direct interregional highways, with necessary connections through and around cities, is needed to meet the growing peacetime traffic of longer range and the requirements of national defense in time of war," the report says.

To Control Roadside Development

At the same time, the Bureau (whose name on July 1 was changed to Public Roads Administration), urges again creation of a federal land authority, with authority to acquire excess right-of-way lands, so as to be able to finance roads through sale or lease of roadside sites, as well as to control roadside structures.

Bureau reports that more than 17,000 miles of highways were improved during the year ended June 30 through its programs.

Nebraska Marketers Adopt 4 Resolutions Opposing 'Gas' Taxes

OMAHA, Dec. 9.—The industry's staggering tax burden was the theme of resolutions adopted during the annual convention here Dec. 5-7 of the Nebraska Petroleum Marketers, Inc. They were:

For repeal of the federal gasoline and lubricating oil tax.

For a state law permitting separate posting of the tax in gasoline price signs. The governor earlier this year vetoed such a measure.

For permitting the special 1 cent state gasoline tax to expire, against another renewal. Half of this penny tax goes for relief, half for county highways.

Against diversions of gasoline taxes, and all funds to be used on the highways. (Nebraska's constitution prohibits bonding the state, hence all roads are built from funds available by taxation).

For deferring the motor-vehicle registration date from Jan. 1 to April 1. A similar resolution was adopted a year ago.

South Carolina Tax 'Take' Up

COLUMBIA, S. C. — November gasoline tax collections totaled $1,086,528 in South Carolina, an increase of $70,137 compared with November 1938 collection figure of $1,016,391. Tax is 6 cents per gallon.

Reargument Sought On Madison Order

N. P. N. News Bureau

WASHINGTON, Dec. 11.—Justice Department has asked U. S. Supreme Court for a rehearing in the Madison mandamus case after a ninth judge has been appointed to fill the vacancy caused by the death of Justice Pierce Butler.

Late last month, the court, by a four to four decision upheld the decision of the Seventh U. S. Circuit Court of Appeals (NPN Feb. 22, page 15) refusing to issue a writ of mandamus ordering Judge Patrick J. Stone to rescind his orders of July 19, 1938, under which 11 defendants in the first Madison oil case were dismissed after they had been convicted by a jury. In case of a split vote in the supreme court the lower court action stands, although a re-hearing may be asked (NPN Nov. 29, page 6).

North Carolina Jobbers Hear Talk on Oil Taxes

RALEIGH, N. C., Dec. 8.—December meeting of North Carolina Oil Jobbers was held here today, with State Senator "Pat" Taylor, of Wadesboro, N. C., as the principal speaker. His talk was a comprehensive report on petroleum tax problems in North Carolina.

"The meeting was well attended and the spirit of the jobbers seems to be improving with each successive meeting," declared Edward B. Juliber, new executive secretary of the association which is being reorganized.

Next meeting of the North Carolina association will be Wednesday, Feb. 14 in Raleigh.

Maryland 'Gas' Demand Up

BALTIMORE, MD. — October gasoline tax collections in Maryland amounted to $1,007,498, bringing 10-month total for the year to $9,595,611, officials report, more than 7 per cent above $8,948,460, collected in Jan.-Oct. period of 1938. Tax is 4 cents per gallon.

Pennsylvania Refiners Hear Talk on Higher Octane Plans

By N.P.N. Staff Writer

BRADFORD, Pa., Dec. 8. — The practical possibilities open to the Pennsylvania refiner to produce higher octane gasoline to compete in present and future markets for motor fuel were discussed here Dec. 6 by Dr. E. R. Smoley, The Lummus Co. The dehydrogenation process was recommended as the most economic and practical process now available and the Polyform process was said to be next in preference.

Catalytic cracking or reforming and alkylation were dismissed by Dr. Smoley as too expensive for Pennsylvania refiners at present—or until there are further developments. Isomerization, a means of producing charge stock for alkylation, is likely to become a commercially practical process within a year, he said.

A figure of $165 per barrel per day was given as the approximate cost of a dehydrogenation unit of 1000 barrels per day capacity whereas the Polyform unit of the same size would cost something over $200 per barrel capacity. While these recommendations and costs were said to depend to a large degree upon the conditions met in individual plants, it was felt that the estimates would meet average conditions closely. It was pointed out that while the dehydrogenation process was a new process the Polyform had been demonstrated by the construction of four plants in the past two or three years.

75,000 Bbls. of 'Gas' Daily

It was the speaker's feeling that new processes are and will be available to the Pennsylvania refiner to enable him to keep competitive. He pointed out that although Pennsylvania crude is generally known as a source of lubricating oil, over 50 per cent goes into gasoline and that this gasoline represents 75,000 barrels per day or 2.8 per cent of the country's domestic demand.

N.P.A. Chairmen Named

The occasion of Dr. Smoley's presentation was the fourth of a series of fall meetings of the Department of Manufacture of the National Petroleum Association. Similar meetings were held in Oil City and Butler, Dec. 7 and 8, at which he also spoke.

These meetings brought to a close the 1939 program and the terms of office of the chairmen of the three divisions. In the Bradford district John Turner, superintendent of the Socony-Vacuum refinery at Olean, N. Y., took over the duties of chairman for 1940 from W. H. Rockman, Quaker State Oil Refining Corp., Farmers Valley, Pa.

Paul Biery, assistant superintendent of the Independent plant of the James B. Berry Sons' Co., Oil City, was named chairman for the Oil City group. He succeeds Dr. F. E. Williams, Quaker State Oil Refining Corp., Emlenton, Pa. In the Butler-Pittsburgh group, T. M. Murphy, general manager, Daugherty Refinery, Petrolia, Pa., succeeds George Kirkwood, Pennsylvania Refining Co., Karns City, Pa. The 1940 series of meetings is expected to get under way in February.

Mississippi Gains Ground With Three More Producers

By Teletype

TULSA, Dec. 12.—Mississippi's new oil field the past week gathered for itself a little more of the industry's interest in new production as the result of the completion of three more producers in the Tinsley area.

There now are seven producers in the pool, six of them getting production from the Selma Chalk and one from the Eutaw Formation after missing the pay in the Selma.

Total production is estimated now at 1500 to 1600 barrels daily. The crude is being shipped to a Louisiana refinery by tank car. At least a dozen wells now are being drilled in the Tinsley area. One of the wells last week, on the west side of the field, was a failure.

Reports from Jackson, Miss., meanwhile, indicate that leasing continues at a brisk rate throughout much of the state, with a number of wildcat wells being started or planned in almost a score of counties. More than 50 geophysical crews are working the state.

More Wells in Nebraska

Two or three additional wells were reported started in the Falls City, Neb. area where the first oil in that state was found recently.

The Nebraska discovery well was reported late in the week to have been shut down temporarily because of pump failure. The well had been pumping slightly more than 50 barrels of oil daily. Two state officials were checking the production in order to certify the well as winner of the $15,000 bonus offered the state for the first producer to make 50 barrels a day for 60 days, provided the production held at that rate for the specified time.

The shutdown was reported due to clogging of the tubing by paraffin. This shutdown probably will force the owners to start afresh on their test for the state bonus.

Illinois Watched

The Illinois fields continued to hold considerable interest as a result of the two new producing horizons, giving some of the fields five producing horizons at the present time.

The Devonian and St. Louis formations are the latest to be added to the list of potential oil reservoirs.

Several operators have started deepening their wells to the Devonian as a result of the discovery of oil in that formation recently. There have been two or three failures to date, which indicates the Devonian is not too consistent in the areas which have been producing so prolifically from the upper formations.

California Producers Hail Voluntary Proration Gains

N. P. N. News Bureau

LOS ANGELES, Dec. 9.—Voluntary curtailment of crude production in California by oil producers has been more successful than in states where the state government prorates production, according to Dana Hogan, of Hogan Petroleum Co., president of the San Joaquin Valley Oil Producers Ass'n., at its annual meeting in Bakersfield this week.

"This has been a momentous year for the oil industry of California," Mr. Hogan told the producers, "for it has witnessed a revitalizing of the system of voluntary conservation and proration with the newly elected Central Committee putting into effect its new rules on June 1; and state legislation, which would substitute political control instead of voluntary control of oil production, enacted by the legislature and signed by the governor, but upon submission to the electorate was defeated.

"Our daily production has averaged 2.2 per cent more than the allotment set by the Central Committee on the basis of the Bureau of Mines' demand figures. Thus, the compliance for the entire state is 97.8 per cent, and if it were not for the overproduction of a certain large field in the (San Joaquin) valley, we would have practically 100 per cent compliance. None of the states having political control of oil production have a better record than this.

'Still Blamed by Other States'

"Despite our successful voluntary conservation system, we are still subject to suspicion from the oil producing states having state control. Because voluntary systems failed in those states, it is difficult for them to believe that a voluntary system such as ours can succeed although it has been operating for 10 years," Mr. Hogan added.

From Jan. 1, 1938 to Jan. 1, 1939 stocks of all petroleum products had mounted from 129,784,000 barrels to 159,574,000 barrels, an increase of 29,790,000 barrels. However, this upward trend in stocks was halted in 1939, with a cut of 4,230,000 barrels recorded up to Nov. 1.

Total crude stocks in the Pacific Coast territory were 49,575,000 barrels at the end of October this year, compared with total of 52,019,000 barrels at the end of October, 1938.

The trend toward decreased crude production will probably continue to hold crude stocks to the downward trend of earlier in the year. California operators cut crude production to 574,964 barrels on Nov. 30, the lowest figure for any day since February, 1937. Average production for the first five days of December was 617,226 barrels, compared with 622,921 barrels daily for the first five days of November.

Average output in November from all California fields was 614,064 barrels daily, compared with 618,319 barrels daily for October. Daily quota for both months was 599,000 barrels.

Canadian 'Gas' Demand Up

OTTAWA — Gasoline consumption in Canada increased 3.78 per cent in the first nine months of this year, compared with the corresponding period of 1938, according to a report of the Dominion Bureau of Statistics. Total consumption for the first three-quarters of 1939 was 506,240,000 gallons, compared with 487,780,000 gallons during the same period last year.

'Co-op' May Integrate

KANSAS CITY, Dec. 11.—Production of crude oil may be the next step taken by Consumers Cooperative Ass'n. which is now completing a 3300-barrel refinery at Phillipsburg, Kansas. Refinery is expected to go on stream about Dec. 28. The co-op has also just completed a 70-mile crude pipeline from Phillipsburg to Ellis county, Kansas.

Sohio Cuts Kerosine

CLEVELAND, Dec. 8.—Standard Oil Co. of Ohio has announced an 0.125-cent reduction in its kerosine tank car prices, effective Dec. 7. New prices are: where full freight rate from Toledo, Lima or Latonia does not exceed 0.62 cent per gallon, the delivered price is 5.375 cents per gallon.

Where Full Freight Rate is:	Price, FOB nearest refinery
0.63 to 1.15c per gallon	4.875c
1.16 to 1.25 per gal.	4.825c
1.26c or more per gal.	4.775c

Crude Stocks Jump 2,350,000 Barrels

WASHINGTON, Dec. 11.—Stocks of crude petroleum increased 2,350,000 barrels during the week ended Dec. 2, the largest weekly increase recorded since the week of May 1, 1937, according to Bureau of Mines figures.

Taken together with the increase reported for the preceding week, the latest reported stocks gain represents addition of 4,326,000 barrels to stocks in the two weeks from Nov. 18 to Dec. 2. Stocks on the latter date were 234,161,000 barrels.

Largest increase was in Texas crudes, of which 1,385,000 barrels were added in the week ended Dec. 2, and 2,040,000 barrels in the previous week.

Stocks in U. S. a year ago totaled 271,065,000 barrels.

Stocks by grade or origin will be found on page 32.

Hold Your Breath, Mr. Oil Marketer— 'Gas' Taxes Are about to Hit the Jackpot

N. P. N. News Bureau

NEW YORK, Dec. 11. — Motorists and gasoline station operators in many parts of the country are being urged to observe a billion dollar "breathless moment" at 11 a. m., Friday, Dec. 15.

Automotive tax statisticians have estimated that at approximately that time the 1939 gasoline-tax receipts of federal and state governments will pass the billion dollar mark—the first time that collections in a single year have ever reached $1,000,000,000.

"In the short space of 20 years the gasoline tax levy has become one of the greatest tax burdens in all history," said Baird H. Markham, director of the American Petroleum Industries Committee, one of the several organizations sponsoring the observation of this "breathless moment".

"In virtually every state, gasoline tax receipts now exceed the total tax revenue from all taxpayers collected by the state in the pre-World War period" General Markham stated. He also points out that the more than $1,000,000,000 to be collected in 1939 will be paid "chiefly by persons with modest incomes. Studies indicate that a majority of U. S. motorists have incomes of less than $30 a week, yet their annual gasoline tax burden averages more than one whole week's wages. Thus something like 11,000,000 U. S. motorists earning less than $30 a week, are economically breathless one whole week or more each year in earning sufficient money to pay their gasoline taxes."

Gulf Coast Refiners Cut Runs as 'Unsold' Stocks Rise

HOUSTON, Tex., Dec. 11.—Stocks of "unsold" motor fuel at the 10 Gulf coast refineries reporting operations to Gulf Coast Refiners Ass'n. crossed the million barrel mark the week ended Dec. 2, registering a 200,218-barrel increase over the previous week. Unsold stocks of aviation gasoline increased 85,492 that week. Refinery runs were reduced 7303 barrels daily, to 78,998 barrels.

Details of the G.C.R.A. report are shown in the next column.

	Houston District		Corpus Christi District		Louisiana District		Total	
	Dec. 2	Nov. 25	Dec. 2	Nov. 25	Dec. 2	Nov. 25	Dec. 2	Nov. 25
Aviation gasoline	153,593	147,382	166,977	87,696	None	None	320,570	235,078
Motor Fuel	667,361	527,000	379,702	319,845	None	None	1,047,063	846,845
Naphtha	None	None	126,137**	123,700*	None	None	126,137	123,700
Kerosine	23,000	23,000	None	None	None	None	23,000	23,000
Diesel Oil	None	None	None	None	None	None	None	None
Gas Oil	78,701	46,813	None	None	None	None	78,701	46,813
No. 5 fuel Oil	None	None	None	None	None	None	None	None
Bunker "C" fuel oil	14,111	4,735	None	None	None	None	14,111	4,735
Crude runs	196,016	243,193	299,030	302,723	57,939	58,192	552,985	604,108

* High octane blending naphtha 65,900 bbls. ** High octane blending naphtha 69,390 bbls.

'Gas' Demand Increase Gains in Momentum

N. P. N. News Bureau

NEW YORK, Dec. 11.—U. S. gasoline consumption this year, as shown by state gasoline tax collection figures, gained ground in September so that the nine-month total was 917,599,000 gallons or 5.73 per cent ahead of last year. At the end of August, 1939's lead was 790,317,000 gallons or 5.73 per cent.

Every state and the District of Columbia shared in the nine-month gain, each having an increase for that period over 1938, ranging up to 9.84 per cent for Arkansas, 9.87 per cent for Michigan, 11.37 per cent for Wyoming, and 19.16 per cent for Nevada, according to an analysis of gallonage figures compiled by the American Petroleum Institute from gasoline tax collection figures.

For the month of September, there was a net increase of 127,282,000 gallons, or 6.67 per cent, over September a year ago. This gain in September, was registered despite a loss in gallonage (as compared with September, 1938) reported for three states—Kansas, Oklahoma and Tennessee.

Increases in September ranged as high as 19.16 per cent in West Virginia. Other large increases included: Alabama, 10.37 per cent; District of Columbia, 12.72 per cent; Florida, 8.28 per cent; Maryland, 13.06 per cent; Michigan, 10.52 per cent; Mississippi, 8.89 per cent; New Hampshire, 12.12 per cent; New Jersey, 10.67 per cent; North Dakota, 8.68 per cent; Ohio, 9.02 per cent; South Carolina, 11.06 per cent; Vermont, 8.62 per cent; and Virginia, 11.61 per cent.

CHICAGO — The annual Christmas party of the Chicago Oil Men's Club will be held Dec. 21 at the club rooms in the Petroleum Building.

Crude Runs Drop, 'Gas' Stocks Rise

N. P. N. News Bureau

NEW YORK, Dec. 12.—Daily average crude runs to stills at U. S. refineries were down 20,000 barrels in the week ended Dec. 9, according to a report of refinery operations compiled today by the American Petroleum Institute.

Stocks of gasoline at U. S. plants again increased, the Institute's report shows, with 831,000 barrels of finished and unfinished motor fuel added to storage. Total stocks of motor fuel on Dec. 9 were 77,196,000 barrels, compared with 70,089,000 barrels on a comparable date last year.

Combined refinery stocks of gas oil and distillate and residual fuel oils decreased over 1,000,000 barrels, according to the report. Light fuel stocks were down 503,000 barrels, while residual stocks held at refineries dropped 588,000 barrels.

U. S. 'Gas' Demand Rises 7%, Exports Decline in October

N. P. N. News Bureau

WASHINGTON, Dec. 11.—Domestic demand for motor fuel in October amounted to 49,687,000 barrels—7 per cent above October 1938 and 787,000 barrels above the Bureau of Mines' forecast for the month—the Bureau reported today.

However, exports were considerably below expectations (3,443,000 barrels against a forecast of 4,500,000 barrels, and actual exports in October 1938 of 4,526,000 barrels), so total demand for the month (domestic and export) was about 280,000 barrels below the forecast.

Runs to stills during the month totaled 110,980,000 barrels, an increase of more than 5,000,000 barrels over September and more than 10,000 barrels over October a year ago, with the result that stocks of finished gasoline increased 2,618,000 barrels, to a total of 68,116,000 barrels, although unfinished stocks declined slighty.

Fuel Oil Demand Up 11%

Demand for light and heavy fuel oils was up about 11 per cent in October, compared with the previous year, and, as a result of improved demand, stocks of both were materially lower at the end of the month than on October 31 a year ago. The demand situation for lubricants and wax continued strong, and the domestic demand for coke registered a material rise.

Illinois' steadily steepening curve of production was temporarily reversed during October—it was practically the only producing state which produced less in October than in September.

Daily average production for the month was 3,683,800 barrels, or 78,200 barrels above the September average and about 94,000 barrels above the Bureau's forecast.

Louisiana's production showed the largest increase, daily average for October being 268,000 barrels, compared with 242,500 barrels in September.

Gasoline Consumption by States, September 1939

	Month of Sept., 1939 Gallons	Month of Sept., 1938 Gallons	% Change	9 Months Ending With Sept., 1939 Gallons	9 Months Ending With Sept., 1938 Gallons	% Change
Alabama	22,154,000	20,072,000	+10.37	182,986,000	170,181,000	+ 7.52
Arizona	8,624,000	8,277,000	+ 4.19	78,923,000	76,227,000	+ 3.54
Arkansas	16,693,000	15,569,000	+ 7.22	133,132,000	121,203,000	+ 9.84
California	160,185,000	145,537,000	+10.06	1,370,421,000	1,309,592,000	+ 4.64
Colorado	20,813,000	20,692,000	+ 0.58	181,748,000	173,369,000	+ 4.83
Connecticut	31,870,000	29,559,000	+ 7.82	258,079,000	243,760,000	+ 5.87
Delaware	5,338,000	4,768,000	+11.95	44,189,000	42,321,000	+ 4.41
District of Columbia	13,038,000	11,567,000	+12.72	111,417,000	103,612,000	+ 7.53
Florida	26,184,000	24,182,000	+ 8.28	270,511,000	252,553,000	+ 7.11
Georgia	31,171,000	28,919,000	+ 7.79	269,287,000	250,541,000	+ 7.48
Idaho	10,296,000	9,884,000	+ 4.17	74,633,000	71,570,000	+ 4.28
Illinois	127,678,000	118,976,000	+ 7.31	1,052,575,000	988,846,000	+ 6.44
Indiana	61,609,000	58,106,000	+ 6.03	501,747,000	473,186,000	+ 6.03
Iowa	48,255,000	45,244,000	+ 6.65	414,182,000	395,919,000	+ 4.61
Kansas	38,934,000	43,755,000	—11.02	372,116,000	367,750,000	+ 1.19
Kentucky	24,851,000	23,626,000	+ 5.18	203,557,000	189,550,000	+ 7.39
Louisiana	22,651,000	21,456,000	+ 5.57	185,631,000	180,575,000	+ 2.80
Maine	15,412,000	14,529,000	+ 6.08	114,158,000	110,384,000	+ 3.42
Maryland	27,155,000	24,019,000	+13.06	217,674,000	203,941,000	+ 6.73
Massachusetts	65,979,000	62,874,000	+ 4.94	539,380,000	511,960,000	+ 5.36
Michigan	102,244,000	92,513,000	+10.52	857,157,000	780,138,000	+ 9.87
Minnesota	53,752,000	51,406,000	+ 4.56	413,226,000	401,146,000	+ 3.01
Mississippi	18,349,000	16,851,000	+ 8.89	152,763,000	141,632,000	+ 7.86
Missouri	58,230,000	54,465,000	+ 6.91	483,076,000	451,242,000	+ 7.05
Montana	12,005,000	11,934,000	+ 0.59	93,400,000	91,172,000	+ 2.44
Nebraska	20,837,000	20,376,000	+ 2.26	176,872,000	170,036,000	+ 4.02
Nevada	4,486,000	4,173,000	+ 7.50	35,030,000	29,397,000	+19.16
New Hampshire	9,260,000	8,259,000	+12.12	70,063,000	64,778,000	+ 8.16
New Jersey	79,909,000	72,205,000	+10.67	653,210,000	623,476,000	+ 4.77
New Mexico	8,372,000	8,102,000	+ 3.33	71,151,000	67,487,000	+ 5.43
New York	174,884,000	165,577,000	+ 5.62	1,426,405,000	1,353,491,000	+ 5.39
North Carolina	38,254,000	35,862,000	+ 6.67	317,698,000	296,098,000	+ 7.29
North Dakota	13,615,000	12,528,000	+ 8.68	103,400,000	101,221,000	+ 2.15
Ohio	123,989,000	113,734,000	+ 9.02	1,017,933,000	951,576,000	+ 6.97
Oklahoma	35,882,000	37,173,000	— 3.47	321,959,000	308,901,000	+ 4.23
Oregon	23,117,000	21,854,000	+ 5.78	184,586,000	174,650,000	+ 5.69
Pennsylvania	137,207,000	127,788,000	+ 7.37	1,098,716,000	1,044,817,000	+ 5.16
Rhode Island	11,812,000	10,782,000	+ 9.55	96,759,000	90,290,000	+ 7.16
South Carolina	18,510,000	16,667,000	+11.06	158,058,000	145,014,000	+ 8.99
South Dakota	12,029,000	11,679,000	+ 3.00	101,904,000	98,984,000	+ 2.95
Tennessee	22,760,000	22,990,000	— 1.00	216,942,000	207,408,000	+ 4.60
Texas	113,923,000	107,980,000	+ 5.50	1,005,121,000	951,014,000	+ 5.69
Utah	9,311,000	8,796,000	+ 5.85	74,433,000	70,001,000	+ 6.33
Vermont	6,956,000	6,404,000	+ 8.62	51,424,000	48,496,000	+ 6.04
Virginia	35,985,000	32,241,000	+11.61	286,046,000	264,315,000	+ 8.22
Washington	32,175,000	31,329,000	+ 2.70	263,926,000	256,245,000	+ 3.00
West Virginia	20,974,000	17,602,000	+19.16	148,477,000	141,854,000	+ 4.67
Wisconsin	52,659,000	50,590,000	+ 4.09	425,592,000	407,481,000	+ 4.44
Wyoming	6,380,000	6,003,000	+ 6.28	52,162,000	46,836,000	+11.37
Total	2,036,756,000	1,909,474,000	+ 6.67	16,933,835,000	16,016,236,000	+ 5.73
Daily Average	67,892,000	63,649,000	+ 6.67	62,029,000	58,668,000	+ 5.73
Change from previous year: Total change	+127,282,000	.....	.....	+917,599,000	.....	.....
Percentage change in Daily Average	+6.67%	.....	.....	+5.73%	.....	.....

Latest Oil Industry Statistics

Trends of Basic Figures

	Dec. 9, 1939	Dec. 2, 1939	Dec. 10, 1938
Crude Production (Bbls. daily)	3,827,350	3,289,200	3,245,100
Crude Imports (Bbls. daily)	48,857	116,290	124,143
Crude Runs to Stills (Bbls. daily)	3,460,000	3,480,000	3,150,000
Gasoline Stocks (Bbls. total)	77,196,000	76,365,000	68,587,000
Gas Oil & Distillate Stocks (Bbls. total)	28,063,000	28,566,000	.....
Residual Fuel Oil Stocks (Bbls. total)	82,477,000	83,065,000	.....

Crude Oil Production for the U. S.

(American Petroleum Institute figures)

	Week Ended Dec. 9 Barrels	Dec. 2 Barrels	Nov. 25 Barrels
Oklahoma	436,650	408,950	425,850
Kansas	161,550	177,250	184,850
Nebraska	50	50	50
Texas	1,568,800	1,060,450	1,552,650
Louisiana	273,900	272,700	271,500
Arkansas	68,900	70,250	67,300
Mississippi	1,700	1,250	1,350
Illinois	337,250	330,950	334,600
Eastern (Ill. excluded)	100,200	105,750	101,800
Michigan	64,950	65,150	64,650
Wyoming	66,250	70,250	73,150
Montana	17,200	17,050	16,100
Colorado	3,900	4,000	3,750
New Mexico	110,750	110,750	109,850
California	615,300	594,900	610,600
Total U. S.	3,827,350	3,289,200	3,818,100
Crude Imports	48,860	116,290	83,430
Total New Supply	3,876,210	3,405,490	3,901,530

Weekly Changes in U.S. Crude Stocks*

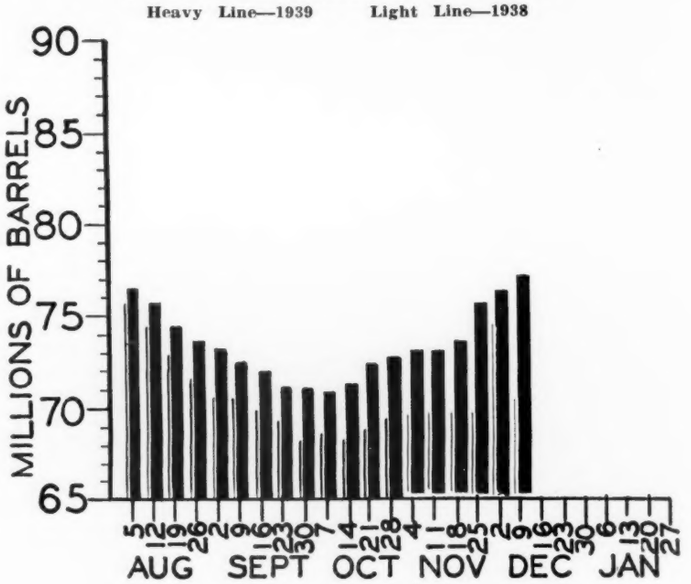
(Thousands of barrels)

Grade or Origin	Nov. 18	Nov. 25	Dec. 2	Chng. from Nov. 25
Pennsylvania Grade	5,010	4,980	4,882	— 98
Other Appalachian	1,357	1,312	1,301	— 11
Lima-Michigan	2,027	1,902	1,760	— 142
Illinois-Indiana	15,809	15,695	15,761	+ 66
Arkansas	2,619	2,647	2,749	+ 102
Kansas	5,611	5,817	5,975	+ 158
Louisiana:	10,405	10,599	10,878	+ 279
Northern	3,749	3,857	3,925	+ 68
Gulf Coast	6,656	6,742	6,953	+ 211
New Mexico	5,544	5,671	5,868	+ 197
Oklahoma	60,065	60,138	59,787	— 351
Texas	65,692	67,732	69,117	+1,385
East Texas	13,926	14,849	15,259	+ 410
West Texas	14,068	14,656	14,701	+ 45
Gulf Coast	17,353	17,510	17,627	+ 117
Other Texas	20,345	20,717	21,530	+ 813
Rocky Mountain	17,853	17,668	17,739	+ 71
California	35,514	35,337	35,396	+ 59
Foreign	2,329	2,313	2,948	+ 635
Total United States refinable	229,835	231,811	234,161	+2,350
Heavy in California	13,717	13,615	13,433	— 182

* As reported by U. S. Bureau of Mines.

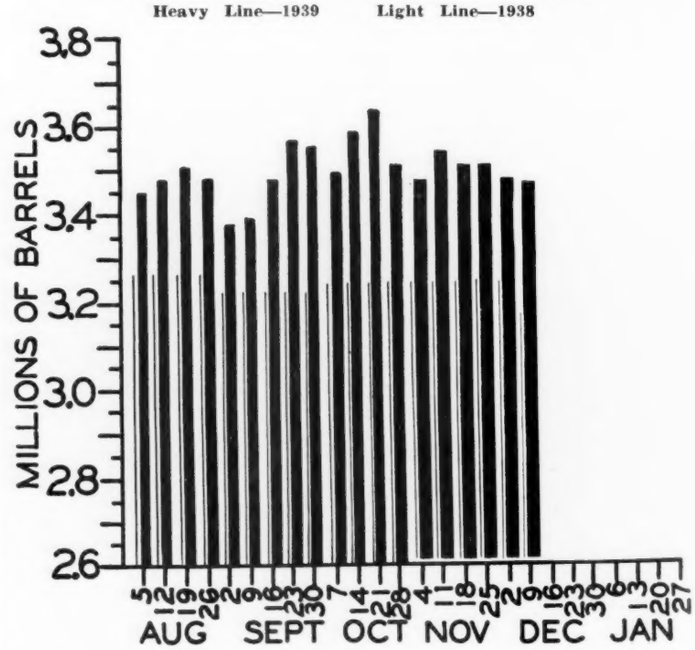
Total U. S. Motor Fuel Stocks

Heavy Line—1939 Light Line—1938



Daily Average Crude Runs to Stills

Heavy Line—1939 Light Line—1938



A. P. I. Weekly Refinery Report

(Figures in Thousands of Barrels of 42 Gallons Each)

Districts	Daily Average Crude to Stills Week Ended Dec. 9	Dec. 2	Per Cent of Reporting Capacity Operated Week Ended Dec. 9	Dec. 2	(a) Gasoline Production Week Ended Dec. 9	Dec. 2	Stocks Total Finished & Unfinished Motor Fuel (b) Week Ended Dec. 9	Dec. 2	Stocks of Gas Oil & Distillates At Refineries Week Ended Dec. 9	Dec. 2	At Terms. Trans. Pipelines Week Ended Dec. 9	Dec. 2	Stocks of Residual Fuel Oil At Refineries Week Ended Dec. 9	Dec. 2	At Terms. Trans. Pipelines Week Ended Dec. 9	Dec. 2
East Coast	571	533	92 8	86 7	1,672	1,520	18,271	17,916	6,085	6,516	5,402	5,634	4,739	4,929	4,114	4,367
Appalachian	117	130	80 7	89 7	441	462	3,222	3,129	272	277	143	155	435	425	.....	.....
Ind., Ill., Ky.	540	571	92 3	97 6	2,152	2,343	11,115	11,219	3,812	3,886	802	827	2,794	2,831	52	53
Okla., Kans., Mo.	256	255	74 9	74 6	(c)969	(c)960	6,339	6,441	1,713	1,717	41	42	2,494	2,578	.....	.....
Inland Texas	120	104	75 5	65 4	484	499	1,667	1,686	407	394	.....	.....	1,750	1,788	.....	.....
Texas Gulf	791	798	83 3	84 0	2,664	2,753	11,401	11,326	5,049	5,346	682	682	6,490	6,581	267	251
La., Gulf	109	114	62 3	65 1	280	331	2,696	2,517	1,210	1,105	24	20	1,453	1,761	267	339
No. La., Ark.	41	42	74 5	76 4	131	116	405	367	246	248	9	6	576	588	.....	.....
Rocky Mt.	48	46	75 0	71 9	229	185	1,112	1,061	153	150	.....	.....	420	426	.....	.....
California	497	522	66 7	70 1	1,381	1,604	15,568	15,353	8,306	8,107	1,921	2,023	59,076	58,883	22,113	22,308
Total Reporting	3,090	3,115	80 6	81 2	10,403	10,773	71,796	71,015	27,253	27,746	9,024	9,389	80,227	80,790	26,814	27,310
U. S. Total (d)	3,460	3,480			12,027	12,383	77,196	76,365	(e)28,063	(e)28,566	9,024	9,389	(e)82,477	(e)83,065	26,814	27,310
U. S. Total 12-9-38 (d)	3,160				10,789		70,089		30,986				117,271			

(a) Includes straight-run, cracked and natural blended.
(b) Includes stocks at refineries, in bulk-terminals, pipe lines and in transit.
(c) 12% of reporting capacity in this district did not report gasoline production.
(d) Estimated, U. S. Bureau of Mines basis.
(e) For comparability with last year these figures must be increased by stocks "At Terminals, etc." in California district.

Refining Technology

INCLUDING INTERNATIONAL PETROLEUM TECHNOLOGY

Dear Reader:

A thorough and able criticism of the C.F.R. method of octane number determination by Dr. Von Philippovich, director of the Institute for Fuel Research of the German Institute for Aeronautical Research, is published in this issue. Dr. Philippovich has examined the method with complete detachment and has proposed modification and amplification of the method.

The presentation of these criticisms offers the opportunity to American authorities who have been responsible for the development of the present standard to answer Dr. Philippovich's criticisms and to bring out how and why our present octane number scale came to be used. Their replies collected by the Society of Automotive Engineers, and also published in this issue, show the complications that arise from trying to employ a theoretically accurate measure of anti-knock quality in motor fuels, rather than continuing to use a practical "bench-mark" until simpler improved methods are developed.

The paper and discussion should clear up in the minds of those who have not been close students of anti-knock rating studies why the present method of rating motor fuels is still the accepted standard in spite of its known limitations. They should go far in re-establishing the American standard in Europe where there has been a tendency to listen to the criticisms and look for improvements along paths that have already been shown in work in the United States to have a dead end. Many do not realize that independent research on anti-knock ratings of fuels has only scratched the surface as compared to investigations conducted and being conducted in this country.

The paper by Dr. Philippovich and the formal discussion prepared by oil technologists was submitted to NATIONAL PETROLEUM NEWS for publication by the Society of Automotive Engineers so that widest possible understanding of the present state of the art of knock testing in this industry. Turn to page R... for the complete paper and discussion.

★ ★ ★

There is more than one item in the past month's news to keep us reminded that the increasing volume of valuable products derived from crude oil and headed, of course, by gasoline, is the achievement of chemists and chemical engineers. With petroleum waste and low value products becoming as important raw materials to the chemical industry as coal tar, the probability of refiners supplying raw materials to be converted into useful chemicals or materials that contain more than hydrogen and carbon, and eventually getting into the conversion operations themselves, eppears a natural development.

It is with interest that we learn of the recognition of Dr. R. E. Wilson, president of Pan-American Petroleum & Transport Co., who has been awarded the Chemical Industry Medal for valuable applications of petroleum research to industry. Since 1933, when the award was instituted, it has spotlighted work on sodium silicates, X-ray analysis, fertilizers, on the wide achievements of Mellon Institute, and other important contributions to industry.

★ ★ ★

Another interesting bit of recent news worthy of more than passing notice by the industry is the announcement bv a Department of Commerce representative in Europe that Germany is rushing the construction of another huge synthetic gasoline plant. Anncuncement is that the new plant will have a capacity of 350,000 tons of gasoline per year and that it is to be completed in 1940.

Those who have visited the tremendous hydrogenation plants now operating on low grade German coal express doubts that a plant of that size can be completed within a year's time. It is suggested that perhaps a year and a half would be a more realistic estimate of the time needed to put the plant in operation.

Necessity often lends wings to achievement, however, and perhaps Germany is faced with grim necessity for more motor fuel with the Reds needing their own petroleum products at home and the Roumanians reported to be decreasing rather than enlarging their deliveries.

Most recent reports said that Germany not only did not have enough fuel to meet demand but that what the country did have was of inferior quality, with low octane number.

Dr. Benjamin T. Brooks recently suggested that there have been many "careless" statements regarding Germany's vulnerability on account of lack of adequate supplies of petroleum products. Dr. Brooks thinks that with the addition of Polish production, Roumania's surplus, and a similar quantity from Russia, the war can go on indefinitely as far as petroleum to meet Germany's needs is concerned. Possibly it is the uncertainties of such an arrangement, if such exists, that prompts the construction of the 3,000,000-barrel-per-year plant to convert coal into motor fuel.

As far as motor fuel quality in Germany is concerned, the handicap of low octane number of Fischer-Tropsch products has been overcome by cracking and other modern processing. Octane numbers of 70 and upwards have not been commercially exploited but can be produced when necessary.

Very truly

J. C. Chatfield

Managing Editor,
Refining Technology Edition.

Engine Fuel Testing and Proposals For Its Further Development†

By Dr. Alexander v. Philippovich *

ABSTRACT

The basic disadvantage of the A.S.T.M. octane number is that it is adapted to the mean value of road knock values. To this may be added the disadvantages of its method of determination, particularly employment of the bouncing pin and measurement at a single fuel-air ratio. To avoid the disadvantages and retain the advantage of international acceptance, it is proposed to retain the Motor method but add further tests. These include determination of octane numbers at 86°, 122°, and 212° F. mixture temperatures, recording the compression ratio prevailing at the point of incipient detonation, introducing an improved instrument for knock indication, selecting fuels for a given engine to use the octane number or incipient knock points obtained at a temperature corresponding with the temperature characteristic of the engine, and investigation of octane number in the range of rich mixture ratios.

A classification of fuels by means of diagram covering materials of known composition is suggested, leading back to a one-point measurement, provided the diagram for the material involved is known. To judge the fuel's overall behavior it is required only that the measured point lie on the required line in the diagram.

THE aim and objective of fuel and lubricant testing must be to provide reliable bases for approval or disapproval of material for definite fields of usage. Such approval can refer to short periods of behavior (for fuels, chiefly knocking) or long periods of behavior (ring-sticking, oiliness, valve corrosion). Approval or disapproval are entirely dependent upon the method of testing and can be defined fully only over the range tested. The narrower the range for which the material is found suitable, the wider, of course, is the unknown or disapproved range. A fully satisfactory test must determine suitability for the widest possible range, that is, it must give a characteristic of the material throughout such a range as to permit a judgment of its behavior to be arrived at for all conceivable conditions, even though these conditions may partly have not actually been encountered in practice. The approach of test methods to this condition must be the object of all effort; that, in this objective, we should strive toward common viewpoints throughout the world goes without saying.

Ricardo was the first to investigate thoroughly the practical significance of knocking, and he made two fundamental proposals which are still observed today: 1, the judgment of knock characteristics on the basis of the highest useful compression in a definite engine, and 2, the use of refer-

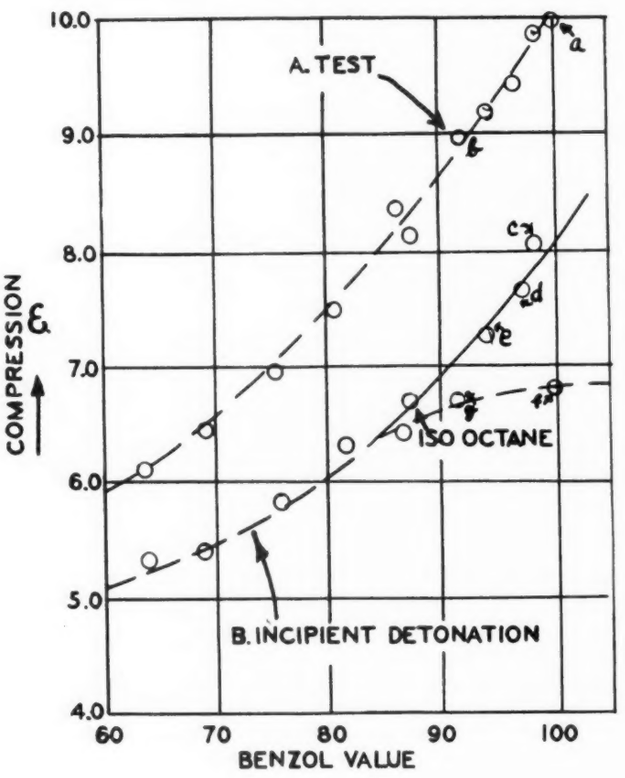


Fig. 1. Relation between test compression and compression in incipient detonation: A, pure benzol; b, engine benzol; c, technical iso-octane and 0.12% by volume tetraethyl lead; d, technical iso-octane and 0.10% TEL; e, technical iso-octane and 0.05% TEL; f, pure benzol; g, engine benzol

† Presented at the World Automotive Engineering Congress of the Society of Automotive Engineers, May 24, 1939 in New York.

* Director of the Institute of Fuel Research of the German Institute for Aeronautical Research.

ence fuels. Even he, together with his co-workers, attempted to replace and to supplement engine testing with a chemical characteristic, but, like his many successors, he did not attain that goal. The reason for this condition is twofold; first, the combustion in an engine is such a complex phenomenon that a simple characteristic depending upon constants or judgment based on chemical-physical behavior does not take into consideration all the influences that are operative in practice; moreover, no clear definition has yet been arrived at as to what is to be understood by "engine behavior," so that the calibration of laboratory methods is possible only to a limited extent.

It can be said that laboratory methods based on integral constants (for example, specific gravity, molecular weight, etc.) are unsatisfactory, while consistent agreement has also not yet been attained with those test methods which, taking into consideration differential influences (such as knock suppressors), investigate a particular phenomenon such as spontaneous ignition. Both of the foregoing reasons forced the development of engine testing as the basis for the evalution of material. Ricardo's proposed test, which as a matter of fact included all essentials, did not prevail because of the high cost of the test engine. The Delco S 30-engine, the Armstrong engine, finally the CFR engine, after manifold attempts to measure knocking in various engines, even multicylinder types, represent stages in development which led truly to better reproducibility of results. It also led to an ever-narrowing range of validity, for the introduction of reference fuels did not make it possible to ignore engine conditions and thereby permit the use of various test engines.

Finally the CFR method was agreed upon, and this method soon attained great international prominence. In it controlling conditions were specified and everywhere formed the fundamental basis for the measurement of octane numbers. The expensive and extensive CFR tests on the Uniontown Hill then led to changes in the method and the establishment of new test conditions because the earlier test method, now termed the CFR Research Method, did not give satisfactory agreement with the values obtained in modern automobiles. This latter test method—the CFR Motor Method—is at the present time the most widespread throughout the world and is also the most exposed to criticism. Its principal characteristic is, that it determines a single evaluating number and attempts so to choose the test conditions employed that the result is in good agreement with the mean value of octane numbers determined under service conditions. (See H. W. Best, Knock Rating of Motor Fuels, Chem. Review 22, 147—1938).

Defects in Octane Number Determination

A defect in octane-number determination may be readily deduced from the above statement of its chief characteristic and consists primarily in the fact that it is determined in such a way as to yield a generally applicable mean value; further deficiencies lie in the measurement of knock intensity by means of the bouncing pin and in the making of the comparison with only a single mixture ratio.

The octane number was intended originally to be an evaluation factor for the rating of fuels in the same way as, for instance, specific gravity and calorific value, or viscosity in the case of lubricating oils. It, therefore, had more or less the characteristics of a material constant, which can always be consistently determined independently of the type of determination in various engines. In view of present knowledge two disadvantages are connected with this conception. We can no longer speak of a constant when deviations of all types are found; moreover, adherence to the conception of the octane number as a constant will have, in the future, the result that every design change will make necessary an amount of new research, enormous in extent, to determine the contemporary valid mean value under the "correct" conditions. On this account, the fiction of the constant represents a Procrustean bed, into which the practical results must be forced until a halfway useful agreement is reached. Practically, this condition manifests

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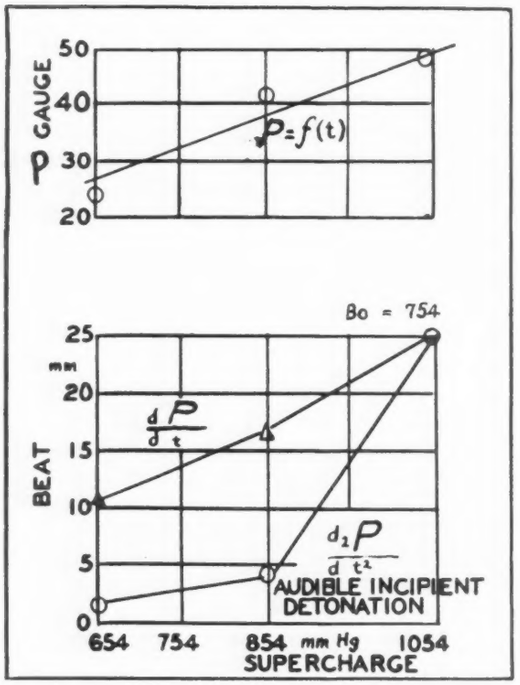

Fig. 2. Measurement of absolute incipient detonation in C.F.R. engine

itself in the fact that octane-number measurement—in the field of aviation—is carried out in the various countries in distinctly different ways, as the following summary shows:

Table 1

Types of Octane Number Determination

Title	RPM	Temperature Deg. Fahr. Cooling Mixture		Type of Knock Indicator
ASTM Method	900	212	300	Bouncing Pin
British Air Ministry.	900	212	260	Bouncing Pin
Low Temperature ..	900	212	No Preheating	Bouncing Pin
L_2	900	212	260	Bouncing Pin
CFR Research	600	212	No Preheating	Bouncing Pin
U. S. Army Air Corps	1200	330	Not measured	Temperature Plug

It is interesting, that even in the United States, the mother country of octane-number measurement, the greatest number of methods are used. From this fact it can be seen clearly that the evaluation according to octane number runs the serious risk of being carried out in various ways, within the immediate future. It seems again necessary to make an attempt to arrive at a uniform test method which will work out satisfactorily under all conditions. However even if the practical validity of a commonly accepted method were not 100%, it would be better than if perfectly correct measurements were made everywhere by different methods; just as men better understand one another when each is a fair master of a common language than when each is a perfect master of his own tongue only.

Use of the Bouncing Pin

Stansfield has shown that, with the strobophonometer, the same evaluation can be obtained at light detonation as with the bouncing pin. On the other hand, Fig. 1 shows that fuels of very different types are evaluated quite differently by using the compression at incipient detonation as compared with the compression employed in octane-number measurement.

The change from the bouncing pin to another knock indicator would be a very worth-while step in the direction of significant values, especially if this knock indicator could be used without modification in full-scale engines. Differences of the type shown in Fig. 1 of course, could still occur, but then they could not be attributable to indicator defects. Fig. 2 shows measurements of this type, in which the pressures from the pressure-time diagram are shown with the first and the second differential quotients at different boost pressures. From this figure it can be seen clearly that the audible beginning of detonation is manifested not in a sudden rise of the indication but in a change of direction of the indication. It would be very useful to know finally what practical significance the different types of knock manifestations have, in order to choose the correct measuring method.

The specification of the CFR Motor Method that testing shall be carried out at the mixture for the most severe detonation was determined empirically. Fig. 3 shows that this method is quite justifiable if it is desired to iron out differences in measurements. In other words, better agreement, based on the same beat (50) of the bouncing pin is secured at the point for maximum knock intensity, that is, at a somewhat lean mixture, than if the mixture ratio is not exactly prescribed. At the same time it can be seen that different fuels do truly have the same knock behavior in octane-number measurement but, in the richer or leaner ranges, differ very distinctly. Naturally, depending on the mixture formation in the full-scale engine, a fuel that is similar, judged by octane number, would show results more strongly deviating, the richer or leaner the mixture under operating conditions and the further the test curves lie apart in a test made according to Fig. 3.

In addition, there must be considered the great difference between mixture formation in the CFR engine and in the full-scale engine. To eliminate this difference in the test method would be difficult if the behavior in the full-scale engine were not known exactly. In the usual octane-number determination, the cylinder contains the mixture that is calculated from volumetric efficiency and fuel quantity, without any fractionation of lighter and heavier constituents, whereas, in the full-scale engine, the cylinder with the leanest mixture has also a larger proportion of the more volatile constituents. According to the detonation characteristics of the individual constituents, there is introduced a rise or fall in the knock value of the fractionated cylinder charge as compared with the value which is found in the CFR engine in the combustion of the integral, that is, the unfractionated fuel.

An important disadvantage of the octane number is that it does not extend to the evaluation of fuels of 100 octane number and over. We are then forced to provide some type of extrapolation as, for example, a relation is established between octane number and permissible compression and, from the compression, the octane number is deduced. More advantageous is the proposal of Homer Dedo (see Heron and Beatty) which establishes a relation between the reciprocal value of mean effective or boost pressure and octane number because, in this way, a straight line is obtained. Both methods abandon the octane number as a basis and go over to an engine characteristic.

Faults in the Use of the Octane Number

Aside from the faults in the determination, per se, of the octane number, there result from the type of its definition and its determination inevitable consequences in its use, which are disadvantageous.

While, in specifying the viscosity of lubricating oils, it has long been customary to specify the values either directly at different temperatures or, for the characterization of the temperature relationship, the viscosity index or the pole height, and everyone concerned knows that viscosity has significance only if specified at a definite temperature, the octane number is repeatedly used as an absolute measure, to a certain extent, as a constant. As much as this use is justified when the relation between composition and knock behavior is being investigated, it is equally inapplicable in practical use. To a certain degree this use of the octane number is justifiable because in many cases, as for example paraffin or iso-paraffin and naphthene hydrocarbons (even with tetraethyl lead), the engine stress—be it measured according to compression or supercharging—increases in like measure with the octane number. Fuels of such types can be evaluated correctly according to this method, while aromatic, unsaturated, alcohol-blended fuels are judged very

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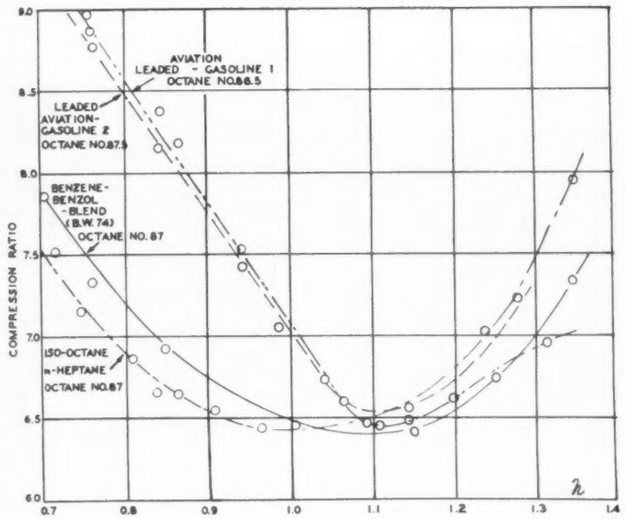

Fig. 3. Determination of knock characteristics at various excess air factors

as a consequence of compression, end pressure and temperature). Hence these factors must be considered in its determination. Any solution, which again results only in a new more or less fortuitous means value for knock behavior of present fuels in the present-day automobiles as the "correct" octane number, involves no correction of this circumstance, and must be rejected a priori. Even improvement in the accuracy of the measurement through consideration of additional influences, such as humidity and carbon, brings no amelioration of the fundamental defect.

The problem is, therefore, only to explore thoroughly a characteristic of a fuel through all possible conditions even though these may not yet be encountered in actual practice. It shall also be valid not only for different engines, but also for different operating conditions of the same engine. For this, two conditions must be fulfilled:

1. Determination of the octane number throughout the range of the most important influence, that is, temperature.

2. Comparative investigation of the full-scale engine as to its temperature.

Whether and what possibilities of another type of fuel testing are conceivable will be discussed later. At this time there can be dealt with only the investigation of the possibility of temperature measurement as a basis of comparison.

The phenomenon of knocking as a chemical reaction is influenced to a prominent degree by temperature. Pressure, in comparison with it, plays only a very subordinate role, which is, moreover, for the most part, inseparably connected with temperature changes; even if it is used in supercharging tests as a measure of knocking, it appears unsuitable for the modification of octane-number measurement. Now the question is, in what form can the temperature relationship of the octane number best be measured? In the U. S. it already has been determined at the Uniontown Hill tests that the difference in the Research and the Motor octane numbers was the greatest in the case of those fuels which showed the greatest deviation of values measured in the automobile. This result led to the term "sensitivity (See Best, above, p. 149). In this difference is included, in addition to the change of mixture temperature, also the change of speed, which for its part again influences temperature. On this account, there is merit in the proposal to carry out octane-number determinations in the future up to the value of 87 in the manner prescribed under the conditions of the Motor Method (ASTM D 357-36T), that is, 300° F. mixture temperature; and also under otherwise like conditions, at 212° F. (100° C.) and 122° F. (50° C.). In this way a uniform test method for the temperature relationship will be observed and the following advantages will ensue:

1. Retention of the Motor octane number in its present form.

2. Inclusion of the most important influence on the change of octane number.

3. The possibility of constructing reference diagrams for fuels of known composition which could later lead to the determination of only a single point for fuels of the same type, that is, a single octane number.

4. After the construction of this diagram, the possibility of supplementing the octane number with a code number, which would refer to the curve of the octane numbers in the basic diagram. If the diagram for aromatics is numbered 1, that for olefins, 2, for alcohol blends, 3, for paraffins, 4; then, for example, the specification 73 would mean that the curve of the diagram of that fuel corresponded to the diagram[2] for an olefin gasoline. What reference fuels should be chosen for these diagrams would be truly determined only after a large number of fuels of typical kinds had been investigated in this manner.

To prepare for the possibility of obtaining another characteristic of the fuel instead of the octane number as a measure of the knocking tendency, in the same manner, diagrammatically, it would be necessary that the incipient detonation at different temperatures through the critical compression ratio be determined. Until further development, this determination could be made by audibility; however, it should be replaced by indicator measurement as soon as possible. It would seem as if the second derivative of pressure over time offers a suitable way to this end[1].

Proposals for Better Characterization of Engines

The determination of the octane-number diagram would still bring no appreciable improvement if the characterization of engines is not likewise further fundamentally extended. Proposals of this type are already old. Ostwald proposed as early as 1926 that the knock char-

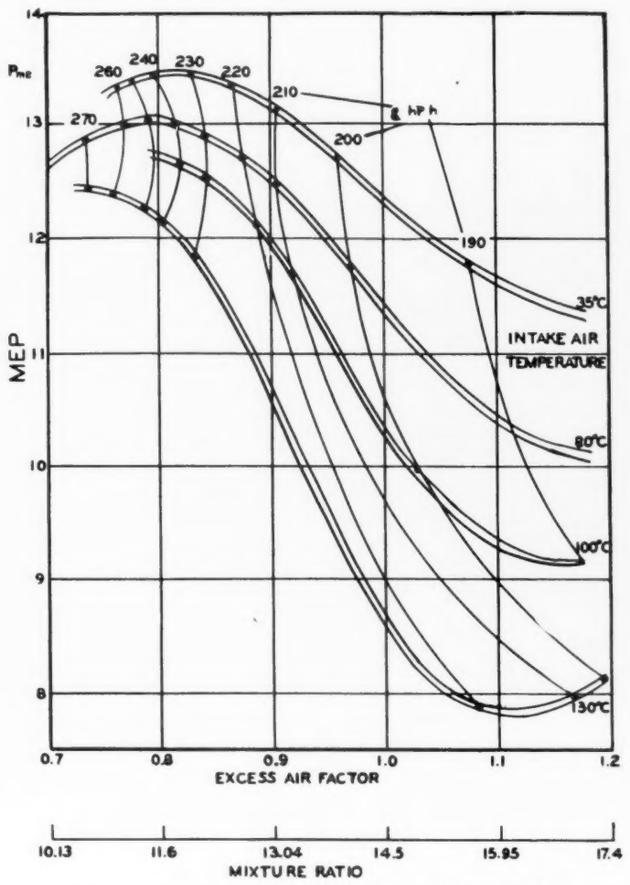

Fig. 4. Test of an 87-octane number fuel by the DVL supercharging method

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wrongly. In engines of very different types and, above all, fuels of varying compositions, the use of the octane number as a constant for the evaluation of knock behavior is impossible.

Proposals for Improvement

That the octane number in its present form is untenable should not be contested. However, an attempt must be made to abide by octane-number measurement in the meantime until a measure of the dependability of the octane number on outside influences has been found. Investigations of recent years have shown that speed and temperature affected the octane number to a large degree, but to a different extent for different fuels (speed probably only acteristics of engines be determined. Jentzsch also, for a long time has alluded to the characteristic of engines based on the compression end pressure. The characteristic of the engine arising from a wholly arbitrarily measured mean combustion temperature was proposed by V. Philippovich as an explanation for the different test results of two CFR engines (Z. ang. Chemi 49, 625, 1936).

It is now time that further final steps be taken in this direction. We cannot expect that even an octane-number curve determined, for instance, over various intake or mixture temperatures will lead to practically usable results if we do not know accurately the operating conditions under which the fuel is burned. Therefore, the proposal is made to investigate the full scale engine thoroughly with reference to its pressure and temperature conditions and, through comparison with the octane-number diagram, to extend in this way the agreement with practice. Even the results of laboratory investigation can then be evaluated much better, than is the case at present, and it is conceivable that, in this way, there may come about a test and rating of fuels in the test engine and in the laboratory that are valid with finality and not subject to continual change. The condition for the determination of knock characteristics of fuels in this way is, in any case, the knowledge that we cannot lay down basically any general figure for knock tendency which can be applied indiscriminately to all engines and operating conditions. Only after the determination of the operating conditions for each individual case may the choice be made of the temperature value of the octane number, for instance, or of some other reference value later to be agreed upon for which the fuel diagram is valid in this special case.

Because of many disagreements a series of other methods for the rating of fuels already is used. This is the case above all for aircraft engines because, for them, the scattering of values results most disadvantageously. A few of such methods are summarized in Table 2.

Table 2

Methods for the Measurement of Knock in Aircraft Engines

Wright—Fuel Consumption per hour against specific fuel consumption, cylinder head temperature and power (In addition, maximum combustion pressure).

Bristol—Specific fuel consumption against: P_{me}, critical knock temperature of intake air.

NACA—Boost pressure against compression and intake air temperature.

DVL—P_{me} against excess air (at different intake air temperatures).

N. R. C. Canada: Consumption per hour against specific fuel consumption, power, cylinder head temperature.

As contrasted with octane number measurement, in all these methods is embodied the principle of a test carried out under various conditions. Fig. 4 shows a diagram according to the DVL supercharging method in BMW 132 single cylinder engine.

In testing according to such methods, one consideration must still be kept in mind: since the power of the engine, or a value depending on the condition of the engine, is chosen as a criterion of fuel quality, we must be certain that this condition is maintained at the proper standard, such assurance is only attainable through the use of reference fuels. The test results can then be either the representation of power as a function of excess air (consumption per hour) and temperature, if the measurement with the reference fuels denotes the standard engine condition, or the specification of what blend of reference fuels results in the same values under the test conditions. The advantage of the first method is that the measurements can be carried out over an extensive range of conditions, the disadvantage, that during operation defects in engine condition may be overlooked and hence give rise to errors. The second method is more accurate, especially if the test fuel is bracketed between two reference blends. However, because of the long test procedure it is difficult to extend its application over a great range, for instance, of excess air values, unless only very few determinations are to be made. Further, the disadvantage, already mentioned, of reference fuels cannot be ignored, namely, that possibly they may not react to outside influences in exactly the same manner as do the test fuels. The reference fuels also can lead to errors, and on this account should not be used for direct comparison, but only as a calibration means for engine condition.

Summary

1. The basic disadvantage of the octane number is that it is adapted to the mean value of road knock values, and a correlation of the results with a single-cylinder engine is, for that reason, only of a fortuitous nature; to this is added the disadvantages of its method of determination (bouncing pin, measurement at a single fuel-air ratio).

2. The important advantage of using octane number lies in its international acceptance.

3. To avoid the disadvantages and retain the advantage it is proposed in the future, at least for a period of transition:

a—To retain the Motor Method.

b—To determine, in addition, the octane numbers at 30° C. (86° F.), 50° C. (122° F.) and 100°C. (212° F.) mixture temperature under otherwise similar conditions.

c—To record, in each determination, the compression ratio prevailing at the point of incipient detonation.

d—To introduce an improved instrument for knock indication, which will give accurate and reproducible values.

e—In selecting fuels for a given engine to use the octane number or incipient knock points obtained at a temperature corresponding with the temperature characteristic of the engine.

f—To investigate the octane number also, in the range of rich mixture ratios.

4. In testing aircraft-engine fuels various laboratories already have succeeded in obtaining diagrams characteristic of knock behavior through the determination of obtainable power against intake air temperature, excess air, or fuel consumption. Measurements of this type appear to be the most suitable for fuel rating.

5. To make possible the correct choice of fuel for a given engine or type of usage the temperature conditions of the engine must be investigated and these data then must be made the basis for the evaluation of fuel characteristics.

6. The classification of fuels by means of diagrams covering materials of known composition, again leads back to a one-point measurement, provided the diagram for the material involved is known. To judge a fuel's overall behavior it is required only that the measured point lie on the required line in the diagram.

[1] F. Lichtenberger and F. Seeber, Note on the Question of Knock Testing Methods. ATZ, Vol. 14, 1938, p. 372.

[1] W. Glaser, "A New Instrument for the Measurement of Gas Quantity for the Observation of Blow-by in the Crankcase, ATZ." Vol. 41, No. 23, 1938, p. 616.

[2] Glaser, "The Effect of Operating Conditions on Piston-Ring Sticking in Endurance Testing of Fuels and Lubricants." Luftwissen 1939.

Octane Number a Bench Mark, Not Procrustean Bed

By D. P. Barnard*

It appears that the author has attempted to treat the subject of engine fuel testing from two completely different points of view, namely, the academic and the practical. In the following comments the author's criticisms of the practical aspects of the ASTM method are considered first. These basic criticisms are as follows:

a.) The octane number is a mean value which, if regarded as a constant, tends to warp the actual facts. (The author states that this situation constitutes a Procrustean bed.)

b.) The bouncing pin is characterized by unacceptable deficiencies.

c.) The octane number is determined at only one mixture ratio.

d.) The octane number range is arbitrarily limited and is unsatisfactory because it does not extend to the evaluation of fuels over 100 octane number.

e.) The octane number is used as a fundamental constant.

f.) The octane number in its present form is untenable.

The fact that the octane number is set up to produce a mean or representative value of ignition quality is entirely true. It is not considered that this necessarily warps the facts, however. To infer that the ASTM octane number is being used as a Procrustean bed could be taken as a direct insult by those most intimately concerned with the development of knock test methods and in the application of knock rating data. Everyone having even a modicum of experience with the subject of knock testing clearly realizes the fact that the ASTM octane number by no means gives the entire story and that it simply serves as a reliable bench mark against which the characteristics of individual fuels and engines and effects due to a change in operating conditions may be compared. It is true that the octane number is used as a basis for commercial operations but this is a matter of classification rather than quantitative application in engine or fuel manufacturing technology. No one recognizes the deficiencies of the present bouncing pin indicator more clearly than those intimately associated with the determination of knocking characteristics.

Many times in the past decade has the subject of a possible substitute for the bouncing pin been seriously discussed. The fact remains, however, that no proposal has yet been made which gives any promise of producing a more satisfactory substitute. The present writer's laboratory conducts more than 2000 octane-number determinations per month from which it can be seen that any improvement in or over the bouncing pin would be more than welcome. The fact remains, however, that every remedy or substitute that has been proposed to date would be far less desirable than the present instrument.

The criticism that the octane number is determined at only one mixture ratio is not valid because the ASTM octane number is a basic reference or bench mark. To introduce variations in the conditions under which such a value is determined would, of course, destroy its meaning. This would particularly reflect upon its use as a means of promoting the widespread understanding so emphasized by Prof. v. Philippovich.

As to the limitations of the octane number range, the author should realize that the present octane number scale is strictly an arbitrary one and as such can be altered or extended as necessity may dictate. From the point of view of its use in gauging motor fuel quality it would appear to be adequate for many years to come. Incidentally, a little thought will develop the fact that *any* fuel scale which can be established is certain to be outstripped as the technology of fuel manufacture progresses.

The comment to the effect that the octane number is erroneously used as a constant indicates a complete misunderstanding of knock testing, at least as practiced in the U. S. It is by no means a constant of absolute value, a fact which is very thoroughly recognized in this country. It is emphasized again that the octane number is employed as a bench mark and not as a complete and absolute answer to all questions as to individual fuel and engine knocking characteristics.

The final criticism that the octane number in its present form is untenable will be taken up later in a discussion of Prof. v. Philippovich's proposals for curing the various ills of the ASTM procedure.

The proposals submitted are roughly as follows:

a.) Determine the octane number for the entire temperature range.

b.) Investigate service engines with respect to both temperature and pressure effects.

c.) Use the ASTM method as a reference.

d.) Conduct knock rating studies under the most important conditions which influence the change of octane number.

e.) From the foregoing construct a set of reference diagrams on fuels of known composition from which may be established a classification code by which the actual knock characteristics of various fuels can be determined from their ASTM octane numbers and a knowledge of their compositions.

f.) Employ reference fuels to calibrate test engines.

g.) Improve instrumentation for knock indication.

The first suggestion, namely, that of the octane number being determined for the entire temperature range, leaves the present discusser rather at sea as to what is meant by "temperature range." The only hint given in the paper is that the "temperature" referred to is mixture temperature. This by no means constitutes the only temperature effect on octane number. It would appear that a study to include the entire or even the most important temperature ranges for a given fuel in one engine would constitute a major undertaking. At the present time it could not be carried out for the simple reason that the important temperatures and the controlling points at which these temperatures prevail are not at all fully understood, nor are means available for their measurement (particularly piston temperature). Therefore it is impossible to set up a schedule for temperature examination which would cover all fundamental temperature variables with any degree of certainty.

The recommendation that service engines be examined as to temperature and pressure effects is an entirely good one as is testified by the number of laboratories in this country which have been engaged for many years in just this type of work (with the note, of course, that such investigations are by no means limited to temperature and pressure effects).

The recommendation that the ASTM (or Motor) method be retained as a reference and that additional information be obtained upon various fuel types to aid in its interpretation does not appear to be particularly astute because this particular procedure has been actively studied for approximately seven years in this country. As to the possible use of a fuel classification system for the purpose of improving the accuracy of information obtained from

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the octane number, it has been thoroughly tried and found wanting by a very wide margin, particularly because of the tremendous variety of fuels which must be considered. Incidentally, the variations in fuel characteristics are becoming wider and wider as manufacturing processes employing chemical methods are finding increased use.

The suggestion that reference fuels be used to calibrate test engines seems a bit peculiar in the face of the author's criticism of the octane number scale. The latter actually constitutes the use of two reference fuels (which may be reliably reproduced) for the purpose of calibrating a test engine. The use of these reference fuels is due entirely to such recognized variations in engine operations as have been pointed out by the author. It would therefore appear that this particular proposal directly contradicts his comment to the effect that the octane number in its present form is untenable.

With reference to the proposal that improved instrumentation be developed for knock indication, this discusser can only request that Prof. v. Philippovich submit any such recommendations as soon as possible.

To consider now the introductory paragraph in which the objectives of engine testing are discussed, it is commented that this demonstrates an academic point of view which, laudable as it may be, completely disregards immediate practical requirements. To state that a material must be examined so thoroughly that its suitability for all possible uses under all possible conditions must be determinable simply does not recognize the requirements of manufacturing industry. Practically all manufacturing technology calls upon highly specialized tests, most of them entirely empirical, for the selection of materials and the control of manufacture and utilization. As a matter of fact, the few qualities which can be completely expressed in fundamental units have largely been developed from experience with empirical tests.

The requirements outlined by the author can be met only when a property can be refined in terms of ultimate units of mass, distance, and time. As knocking characteristics have not yet even been defined in such fundamental terms it would appear that their actual quantitative expression in such units is very far in the future. In the meantime, a wholly empirical test, namely, the ASTM (Motor Method) octane number is providing a very reliable bench mark from which to gauge the performance characteristics of fuels and engines and to guide their development. (Similar comments could be made with regard to the discussion on engine lubricating oil testing.) A number of laboratories in the United States exchange fuel samples monthly. Resulting experience over a period of several years indicates that the ASTM octane number is determinable within an expected error of about 0.3 octane number. This can be achieved in any country in the world at a minimum of expense and time.

It is therefore submitted that if a basic range to promote the widest possible understanding of the subject is required, as is pointed out by Prof. v. Philippovich, the most practical means for its achievement consists in the use of the ASTM method with due recognition of the fact that it is a reference point or bench mark and not the complete answer to all individual questions. The ASTM octane number should be supported by thorough research upon individual fuel and engine characteristics and any possible means for improving the reliability of the ASTM octane number technique and the interpretation of octane numbers should be developed. In the U. S. the use of the ASTM octane number has served to make available improved motor fuels whose knocking characteristics are so dependable that the car manufacturer may design his vehicles to economy and performance standards which would otherwise be wholly impossible. It is believed that this record is sufficient to indicate that the most serious consideration should be given before the use of the ASTM octane number procedure is questioned.

Antiknock Confusion Not Due to Octane Number Scale

By S. D. Heron *

The major fundamental difficulty in knock testing is due to the fact that two fuels, which are equal in knock rating under one set of conditions in one engine, are not equal when conditions are varied in that same engine or when another engine of different type is used.

Dr. von Philippovich appears to believe that much of the confusion arising from the fact that the knock test engine does not completely determine the relative full-scale engine "knock" value of diverse fuels may be largely charged to the use of the octane number scale. With this belief the writer strongly disagrees.

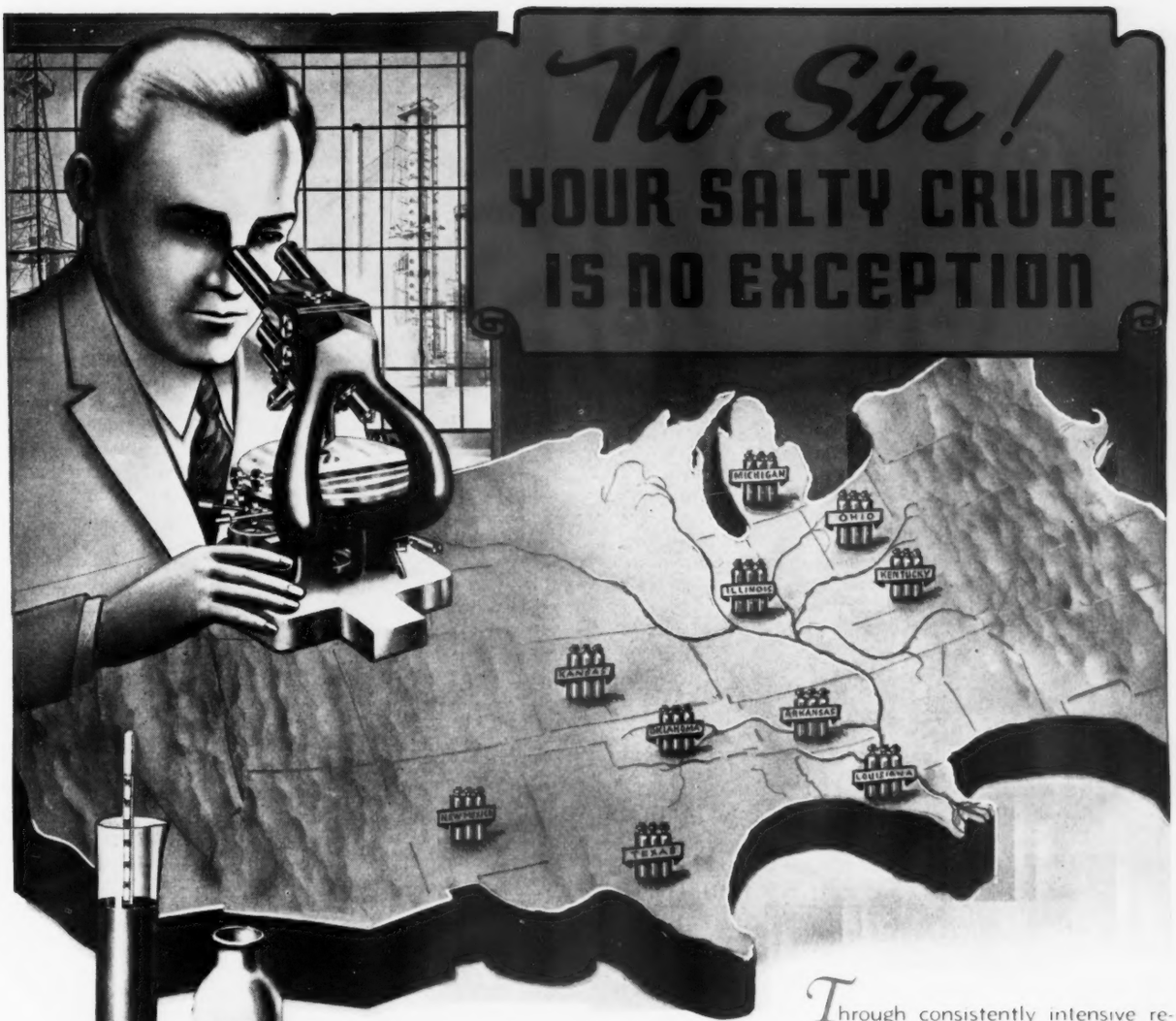
It has been generally found that knock-rating values measured in terms of octane numbers under supposedly rigidly standardized engine test conditions may vary slightly from day to day in the same engine, and from engine to engine in similar engines on any given day. If knock-ratings are measured in terms of an engine function such as compression ratio rather than in terms of a pair of reference fuels, the variation in this engine function is generally much greater than is the variation in terms of a pair of reference fuels. If fuels are to be rated with varying engine conditions such as speed, cylinder temperature, intake temperature, and mixture strength there would appear to be justification for expressing the results in terms of a pair of reference fuels tested under the same conditions rather than in terms of engine functions.

It is true, of course, that it is possible to build and operate knock test engines so that fuel ratings can be reliably expressed in terms of engine functions. Engines suitable for such work, however, are a great deal more costly than the present C.F.R. engine and require rigid control of pressure, temperature, and humidity of the intake air, in addition to close control of cylinder temperature, speed and other variables. It does not appear to be understood in some quarters that the octane number scale is nothing more than a convention for expressing relative engine performance of fuels.

Dr. von Philippovich states that temperature is the most important function in knocking and that pressure plays only a minor part in comparison. With this flat statement vigorous disagreement may be expressed, since many of the knock testing phenomena which have been charged to temperature in the past, have recently been shown to be partly explainable on the grounds of pressure or density effects. Variation of the intake density at which ratings are made can have large effects on the relative ratings of diverse types of fuels. Variation of intake density, of course, has to be compensated for by change of compression ratio or spark advance, and these variables may and do produce temperature changes before and during combustion of the charge.

Dr. von Philippovich somewhat casually dismisses the

* In charge of aeronautical research, Ethyl Gasoline Corp., Detroit.



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effects of engine speed as one of the important variables which may affect the relative ratings of a pair or more of fuels. When supercharged knock ratings are carried out on straight-run gasolines or heptane-octane blends it is generally found that higher indicated mean effective pressures (brake plus friction mean effective pressures) are permissible as the engine speed is increased. In the case of aromatics, olefins, and alcohols, increase of engine speed usually diminishes the permissible mean effective pressure.

Increase of engine speed generally produces higher temperatures of the cylinder, piston, and spark plug and these can be suggested as temperature effects reducing the ratings of the aromatics and other sensitive fuels. In the case of the paraffins and other insensitive fuels, increase of engine speed produces considerable temperature increases of all parts of the cylinder unit, despite which the permissible I.M.E.P. is higher than at the lower engine speeds. In some cases engine speed has been increased by 100 per cent and cylinder wall temperatures increased by 250° F. and under these conditions paraffins and other insensitive fuels still permit higher I.M.E.P.'s at the higher engine speed than they do at the lower speed.

Similar effects of engine speed have been found by a number of workers using unsupercharged engines with variable compression ratio. The effects of engine speed in fuel rating and the probable reasons for its pronounced influence in the case of some fuels have been extensively discussed in the literature, and the discussions of: Lewis and Von Elbe (1), and Rothrock and Biermann (2) are of particular interest.

In short with respect to engine speed it would appear wise to take nothing for granted. It would seem rather that the range of engine speeds should be extended upwards and that a great deal more information should be obtained before it is concluded that this phase is understood.

In regard to Dr. von Philippovich's proposal to make octane number determinations by the A.S.T.M. method and also by modifications of this method using mixture temperatures of 30, 50, and 100° C. It is probable that this will merely supply somewhat more information than is now given by the combination of tests by the A.S.T.M. Method and by the C.F.R. Research method which combination is generally used for determination of fuel sensitivity in the U. S.

Also, since it is proposed to use A.S.T.M. method with various mixture temperatures for fuels of up to 87 A.S.T.M. octane number it is presumed that it is intended to apply it to aviation fuels. Any proposal to apply this method to aviation fuels is unlikely to meet with acceptance in the U. S. for the following reasons:

(a) A large amount of full-scale multi-cylinder aircraft engine data (3) (4) have already shown that the A.S.T.M. method is inadequate for fuels of over 83 A.S.T.M. octane number. There is no evidence to indicate that information as to the effects of varied mixture temperature will enable the inadequacies of the A.S.T.M. method to be overcome as a result of examination of mixture temperature sensitivity effects.

(b) In this country it is generally agreed that knock testing of service aviation fuels by one method up to 87 octane and by another method for higher octane numbers is inacceptable and that a single method must be available for all service fuels. It is agreed in this country that a single method can be worked out to cover the present needs of service fuels but it is also agreed that this method will not at present be suitable for rating fuels with anti-knock values which can be obtained in the laboratory but which are not available for service use.

The minimum rating method has been generally accepted in this country as the safest procedure. This method is based on rating any given fuel type in a number of full-scale multi-cylinder aircraft engines against a pair of reference fuels which are essentially normal heptane and iso-octane. From these multi-cylinder data the lowest full-scale engine octane number can be determined and knock-test methods can then be developed which will agree with these minimum ratings within fairly close limits. While it is generally agreed that it is desirable to have a single knock test method which will cover the entire range of octane numbers in service use, it is also believed in many quarters that a second test method is required which will determine the effect on octane number of variations of engine test conditions. There is reason to believe that simple modifications of engine conditions not requiring any actual change of equipment will be sufficient to readily determine whether the relative engine performance of a fuel is considerably affected by test conditions.

(c) The major and most important use of knock testing is the routine examination of fuels to determine whether they are adequate for service use and whether they meet specifications. This type of testing may involve tens of thousands of samples per annum and Dr. von Philippovich's proposal would increase the present amount of work by 300%. The use of two methods in all, giving both an octane number and a sensitivity rating, will involve an increase of 100% in test work in comparison with present American practice and for this reason alone will not be adopted without serious consideration.

Dr. von Philippovich states that an important disadvantage of the octane number scale is the fact that it does not evaluate fuels of over 100 octane number and indicates that this is a reason for adopting an engine function as a measure of fuel value rather than using any scale based on a pair of reference fuels. The inadequacy of the octane number scale for fuels of over 100 octane number does not necessitate abandoning a fuel scale. Blends of heptane and octane, both containing lead (for example, 1 cc. $PbEt_4$ per liter) may be used with satisfactory results and other similar scales with higher upper limits have been proposed.

Dr. von Philippovich states that in the case of paraffins and iso-paraffins, octane number is a measure of engine stress and refers to work in these laboratories which showed that output is a hyperbolic function of octane number. Further work by these and other laboratories has shown that the variations of I.M.E.P. and compression pressure in the case of supercharged engines, and compression ratio and compression pressure in unsupercharged engines, are approximately hyperbolic functions of octane number. These relations are sufficient to show that engine stress is far from directly proportional to octane number.

(1) Discussion of "Knock Rating of Motor Fuels," (H. W. Best) by Bernard Lewis and Guenther von Elbe, Chemical Reviews, Vol. 22, p. 155 (1938).

(2) "The Knocking Characteristics of Fuels in Relation to Maximum Permissible Performance of Aircraft Engines," by A. M. Rothrock and Arnold E. Biermann, Report No. 655, National Advisory Committee for Aeronautics.

(3) "Rating Aviation Fuels in Full-scale Aircraft Engines," by C. B. Veal, S.A.E. Transactions, Vol. 38, No. 5 (1936).

(4) "Rating Aviation Fuels—in Full-scale Aircraft Engines" by H. K. Cummings, S.A.E. Transactions, Vol. 43, No. 6 (1938).

Engines Should Be Rated

By R. F. Seldon*

This paper bears evidence of a very thorough appreciation of the fundamentals of the fuel rating problem. For this reason it is regrettable that the author has not found it possible to present a more detailed treatment of German experimental technique and results.

There is as yet no indication that full-scale engine operating conditions will become standardized in the immediate future; hence, the necessity of rating engines as well as fuels as the author points out. Otherwise, the existing expedient of determining the fuel requirements of each engine type is the only alternative. This, in effect, is one method of rating engines whether engine manufacturers wish to admit it or not.

*Asst. Physical Chemist, Langley Field, Va.

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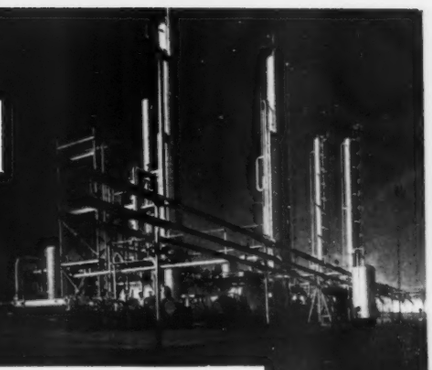

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Octane Rating Shortcomings Not Serious

By A. L. Beall *

In any consideration of testing fuels for knock value, there may be an approach from any one of three types of interest. One interest will be that of the fuel manufacturer, interested to know the range of applicability of the fuel, whether or not it is suitable for aircraft engine use and over what range of engine types. Another interest will be that of the engine manufacturer who, because of availability, cheapness, or for some other reason may wish to adapt his engine design to accept a certain type of fuel. Finally and of widest general interest is the knock value of the fuel determined and expressed in a form which at least to the initiate should tell what performance limits the fuel should establish for any engine of interest.

Obviously the author of this paper has given much study and serious consideration to the third type of interest, but his views seem to be more than a little tinged with interests one and two.

As pointed out by the author, the C.F.R. Motor method, A.S.T.M. method has the widest acceptance as a method for testing the knock value of aviation fuels, despite its measured shortcomings for the purpose. The C.F.R. committee is actively engaged in an endeavor to provide a more useful substitute, but it is believed the author is incorrect in his statement that the so-called L3 and the C.F.R. Research method are used for the evaluation of aviation fuels. The use of the low temperature method so called is unknown to the writer.

In fact, the situation is much less confused than the author's pessimism would lead one to believe. For the moment, the C.F.R. Motor method is employed in this country, with a full knowledge of its shortcomings and with other limitations incorporated in the fuel specifications to support the weakness of the method.

In so far as aviation fuel is concerned, the activity surrounding the development of methods and limitations of existing methods for automobile fuels, has been of little interest. The technical group interested in aviation fuels has evaluated the requirements of a method suitable for aviation engine fuels and this method is well along toward trial use.

For general use, a knock value of any fuel must be expressed in such a way that the engine manufacturer stating the fuel requirements of his engine, the airline or other user of aviation fuel, can with confidence name the required knock value of the fuel, certain that irrespective of the conditions of use in the given engine, the fuel will always provide acceptable performance. In effect, this means that the rating of knock value for the fuel must be that representative of its performance under the worst conditions it is possible for it to encounter in service.

A knock value for a fuel which will change appreciably with respect to a reference fuel, with changes in mixture temperature or boost pressure, is useless for general application. For a single or small operation it is undoubtedly possible to specify mixture temperature limits or boost limits for a given engine, but for wide application such distinctions for fuels cannot be applied. Consequently, in the case of a reference diagram such as that proposed, it would only be safe to specify one point or value, namely that at which the fuel under consideration equaled the reference fuel of the same knock value under the most severe conditions of operation.

The characterization of engines based on their operating conditions is the problem of the engine manufacturer who solves the problem for each model engine developed. The fundamental characterization of the engine is always represented by the operating conditions which will be most abusive to the fuel. This fundamental characteristic should be and undoubtedly is known for each engine before the knock value of the fuel required for it is published.

Much of the work proposed by Dr. v. Philippovich is under way or projected in the C.F.R. committee, except selection in absolute terms the method to be finally adopted for the laboratory determination of knock value. For the present at least, a method will be selected providing one value, safe to use under all conditions. The writer, at least expects the chosen method will fairly well represent the characteristics of the non-paraffinic fuels as it is freely admitted the present method does not.

* Research Engineer, Wright Aeronautical Corp.

Multi-Cylinder Test Engine Adds Confusion

By M. S. Kuhring *

I would like to thank Dr. von Philippovich for his paper. The problem of octane ratings is extremely important and any contribution which sheds light upon the subject should be very welcome.

The author refers to the difference in mixture strength reaching the cylinder of the C.F.R. engine and that reaching certain cylinders of the full scale engine. It would appear quite likely that the difference between fuels reaching individual cylinders of a full-scale engine might be greater, to say nothing of the difference between engines of varying types. The use of a standard single cylinder engine, such as the C.F.R. unit would at least eliminate some of the innumerable variables which enter into the problem.

Dr. von Philippovich refers to the almost universal use of the Motor method. It is agreed that this method is in quite general usage, but it must be remembered that a successor to this method is being developed for fuels of 87 octane number and over, by the C.F.R. committee. This method is based upon investigations carried out by the committee, first—to determine what variations there might be between the operation of various fuel types in full-scale engines and secondly—what changes might be made in the Motor method so that results obtained in full-scale engines would be duplicated in the laboratory.

Naturally, this information has been obtained on a limited number of full-scale engines and it would be interesting if Dr. von Philippovich has any available information on the behavior of fuels of various types in engines in his country.

Dr. von Philippovich states that the term viscosity, when qualified by temperature, is a term that is readily

* Engine Laboratory, National Research Council of Canada, Ottawa.

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understood, but that the term octane number does not have the same significance. Should a standard method or methods of rating fuels be adopted, I do not see why the term should not have much the same practical significance. However, it would be necessary to have some definite standardization of the method and engine used to make this possible.

It is suggested in the paper that temperature has an all-important bearing on the rating of a fuel. This is a point that is open to question. It is further suggested that one approach to the problem of classifying fuels would be to draw up a family of curves, on a single cylinder engine, based on charge temperature. It would then be possible to carry out routine tests of ensuing samples at any point on the proper curve. This, if possible, would entail knowledge of the constituents of the fuel and its treatment. This information is not always available and, in addition, might be extremely confusing, particularly in the case of blends of fuel types.

In my opinion, a knock-rating test, based upon experience and accepted as a standard, would go a long way toward simplifying the problem. There is no doubt that, with variations in engine design, there will be differences in the effects of fuels, from one engine to another, but this is a problem for the individual engine manufacturer, when he selects the fuel to be used in his engine.

Knocking Problem Not One of Temperature Alone

By L. E. Hebl*

The paper submitted by Dr. von Philippovich, in its broad implications, calls attention to the fact that temperature is the No. 1 factor influencing detonation. No attempt will be made to discuss the merits of the argument, however, a brief outline should be given of the general plan of the C.F.R. committee's attack on the problem of evaluating the knocking characteristics of fuels.

First of all, as discussed by Dr. von Philippovich, the purpose of a laboratory test is to simplify, expedite, and reduce the cost of determining how a fuel will perform in service. Prior to 1930 the C.F.R. committee produced a simplified engine so equipped that a rapid and reproducible fuel rating could be made in the laboratory. No sooner had this been done than the phenomena discussed by Dr. von Philippovich was noted, i.e., the fact that the relative knocking tendencies of different fuels will not be the same in two engines which are operated at different temperatures. Consequently, a representative group of automobiles was thoroughly investigated at Uniontown hill in 1932 in order to determine what average temperatures should be employed in the test engine in order that fuel ratings would agree with the average values obtained in the cars. This resulted in the Motor method testing procedure which was ultimately standardized by the American Society for Testing Materials.

Full-scale testing in airplane engines to learn whether a similar set of average temperatures could be established for use in the laboratory when testing aviation fuels was immediately begun and in the meantime the Motor method was adopted arbitrarily for use in rating aviation fuels. This method was confirmed for motor fuels by tests on a second set of automobiles in 1934. It appeared from these tests that the average temperatures in an automobile engine had not greatly changed with the newer models so that the position of the Motor method as regards validity of results had not been altered.

In the following year, 1935, the first set of full-scale tests on airplane engines was completed. When the ratings obtained on these engines were compared with those made by the Motor method, it was quite obvious that certain types of fuel, notably aromatics and olefins, did not possess as great resistance to knock in the full-scale engine in comparison with the paraffinic reference fuels as they did in the laboratory test. However, for reasons of poor stability in storage, inferior heating value, and other reasons, these fuels had not received as much favor for commercial use in this country as paraffinic straight-run gasolines. Consequently, the problem of obtaining the correct rating on such fuels was not an immediately pressing one so the Motor method was retained temporarily until more complete full-scale information could be obtained.

In the meantime, a laboratory project was organized to investigate the effects of changes in the laboratory test method on the ratings for the main groups of hydrocarbon fuels, paraffinic, aromatic, and olefinic. In this work it was learned that the olefines were sensitive to the pressure in the cylinder as indicated by changes in volumetric efficiency. Paraffinic fuels, on the other hand, were almost insensitive to this factor, in fact one hydrocarbon was found, 2, 2, 3-trimethylbutane, which according to the Motor method has approximately the same antiknock value as iso-octane, but which under high pressure and temperature conditions is superior to iso-octane with 6 c.c. tetraethyl lead per gallon.

As a result of these studies, it seems quite apparent that the knocking problem cannot be completely simplified into one of temperature alone. If this were true, it should be possible to find a certain jacket or intake temperature at which the unsupercharged laboratory engine would give the same ratings as the average airplane engine. This has been definitely disproved for, in addition to the engine temperatures, the pressures must also be at least approximately correct. Similarly the ratio of fresh charge to residual exhaust gas as influenced by the compression ratio, the mixture strength and spark advance must also be properly adjusted. As a result of all this, the committee now feels that no method can give the same ratings that are obtained in service unless the engine is equipped for supercharging similar to those engines used in actual flight. However, as stated at the beginning of this discussion, one of the major purposes of a laboratory test method is to simplify the evaluation of a fuel. The adoption of supercharging seriously conflicts with this aim, so considerable work will be required to develop a suitable laboratory cylinder and auxiliary apparatus. In the meantime, a "stop-gap" method has been developed which can be used for rating fuels in fair agreement with full-scale results. This method, though not yet approved, makes it possible to test a number of fuels in the anti-knock range above 100 octane number, which is approximately the upper limit of the Motor method. Several schemes are being considered for extending the octane number scale itself above 100.

Despite the work on the "stop-gap" method, plans are going ahead for the development of a simplified procedure using a supercharged engine. A cylinder has been designed by S. D. Heron, Ethyl Gasoline Corp., and castings have already been made. This supercharged cylinder will be ready to run shortly, but before a supercharged knock test method can be standardized for submission to the A.S.T.M., it will probably be necessary to design a simplified source of air pressure, simple equipment for air conditioning, larger electric loading motors, and also a simple procedure for carrying out the test. These and similar problems are being actively studied by the C.F.R. committee. When once the equipment has been developed for running the laboratory engine under supercharged conditions approximating those which exist in modern aircraft, there is every reason to believe that it will be possible then to find a set of engine temperatures for the laboratory engine at which the antiknock values of aviation fuels will be in the same order as in aircraft full-scale engines.

* Assistant director, engine research laboratory, Shell Petroleum Co.

Dr. Robert E. Wilson

Chemical Industry Medal Awarded To Dr. Robert E. Wilson

807

ROBERT E. WILSON has just been honored by the 1939 award of the Chemical Industry Medal of the American Section of the Society of Chemical Industry (British). The award was made at a joint meeting of the section with the New York sections of the American Chemical Society and American Institute of Chemical Engineers.

The medal is awarded annually by this 45-year old group "to a person making a valuable application of chemical research to industry. Primary consideration is given to applications in the public interest." The medal is considered by the society as "one of the most important of the medals and distinctions awarded by it and its sections."

Dr. Wilson is the first representative of the petroleum industry to receive this medal. It was instituted in 1933 to replace the Grasselli medal which was awarded annually for the preceding 13 years in recognition of somewhat similar achievements. The Grasselli medal was awarded in 1930 to Dr. Per K. Frolich, director of chemical laboratories of Standard Oil Development Co.

Dr. Wilson has been executive head of Pan-American Petroleum and Transport Co. for the past five years. He began his oil career as assistant director of research for Standard of Indiana in 1922. Under his direction a complete engine laboratory was built to study motor fuels and lubricants. In 1929 he organized and became director of Standard's patent and development department. In 1931 he was elected to the board of directors as vice president and head of research, patents, and development work. During twelve and a half years with Standard he contributed often to the literature and patents of the industry. He has also been active in the American Chemical Society, American Society of Chemical Engineers, and American Petroleum Institute.

Dr. Wilson was largely engaged in research before he entered the oil industry. After being graduated from Massachusetts Institute of Technology in 1916 he spent a few months with General Electric Co. and then returned to M. I. T. as Research Associate. During the war he directed research on gas mask absorbents and after the armistice returned to M. I. T. as director of the research laboratory of applied chemistry and associate professor of chemical engineering.

The medal was presented by James G. Vail, Philadelphia Quartz Co., first recipient of the medal in 1933. Thomas Midgley, Ethyl Gasoline Corp., spoke on the personal side of the medalist's life and Bruce K. Brown, Standard Oil Co. of Indiana, described his technical achievements.

In his acceptance speech Dr. Wilson spoke on the growing importance of refinery gas as a raw material, stating that in refinery gases "oil refiners have uncovered a veritable chemical mine in their own back yards" in the past 20 years and "the next 20 years will see further developments of equal or greater importance." The inexhaustible extent of this source of chemical raw material was made

evident by an estimate that 14,000,000 tons per year of cracking gases are available. This corresponds to 940,000,000 cubic feet per day. He said that oil refinery gases are as fundamentally important to aliphatic chemistry as coal tar is to aromatic chemistry. Yet, in spite of this fact, refinery gases lay entirely neglected for many years after the chemistry of coal tar and its derivatives were thoroughly developed. Not until the production of refinery gas began to be increased by the widespread adoption of cracking did refineries begin to consider recovering the gas. Selected portions of Dr. Wilson's address follow:

The real awakening to these latter possibilities began about 1921, with the Carbide and Carbon Chemical Corp., the Standard Development Co., and Arthur D. Little, Inc., as the outstanding pioneers in the chemical field. The Universal Oil Products Co., and M. W. Kellogg Co., the Standard Oil companies, of New Jersey and Indiana, and the Phillips, Shell, and Anglo-Iranian Oil companies, have been leaders in the development of other uses for refineries.

Composition of Refinery Gases

Refinery gases, which are primarily hydrocarbons with one to four carbon atoms, come from two principal sources: roughly 30% of the total is essentially natural gas dissolved in the crude oil and driven off in the process of distillation. This gas contains only the saturated hydrocarbons. The amount of such gas per barrel of crude varies considerably, depending upon the treatment to which the crude has been subjected between the producing field and the pipe line, but the modern tendency toward the use of vapor-tight tankage and prompt movement through pipelines direct to the refinery has tended to increase the quantity of such dissolved gas. Fortunately the percentage of the heavier hydrocarbons is progressively greater than that in most natural gas because the higher the molecular weight of the hydrocarbon, the greater its solubility in petroleum. Since the heavier hydrocarbons are generally of more value as raw materials, refinery gas is more desirable for such purposes than is ordinary natural gas, which consists very largely of methane.

The gas produced in cracking differs from the dissolved gas in containing generally from 12% to 25% of olefins (from 20% to 40% on a methane-free basis). It is accordingly the preferred source of chemical raw materials as it can be segregated in most refineries without any great difficulty. Furthermore, in connection with the fractionating and stabilizing operations carried out in modern refineries, it is frequently possible to secure special cuts which are low in methane and high in their content of the higher hydrocarbons.

The composition of cracked gases varies considerably, particularly as to the percentage of olefins present, depending upon the conditions of cracking. In general, the lower the pressure and the higher the "cracking per pass," the greater the amount of olefins, which accordingly reach a maximum in the low-pressure vapor-phase type of operation; whereas the percentage of olefins is surprisingly low in the old type of pressure distillation processes where the gasoline is distilled out of a body of the oil about as fast as it is formed. Higher pressure coil cracking processes give a gas of intermediate composition. It is impossible to secure accurate figures for the average composition of refinery gas the country over, but the accompanying chart probably represents a fairly typical analysis for gas mainly from high pressure coil cracking.

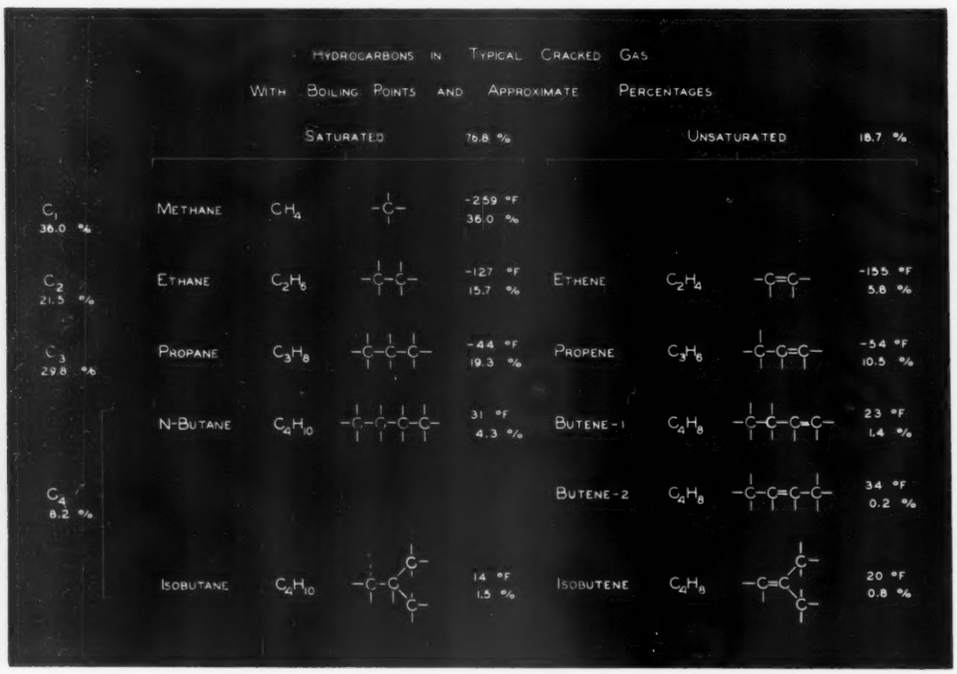
There is a special type of cracked gas of importance to the chemical industry made by cracking a narrow cut consisting largely of propane, which gives primarily C_2 and C_3 hydrocarbons with a minimum of methane, and a high concentration of olefins. At locations where propane is cheap, this is often a cheaper source of the desired olefins than to attempt to concentrate them from refinery gas.

Most of the discussion which follows will apply principally to cracked gases including gas made by the cracking of the propane cut, etc. In general, the saturated hydrocarbons function largely as diluents in the utilization of refinery gases for chemical purposes, but in the few cases where saturated hydrocarbons are desired it is better to start with the gas which comes off in the straight distillation operations, which is ordinarily available as a separate cut if desired.

Since more than half of this country's present gasoline is made by the cracking of heavier oils, and since increasing quantities of even the "straight run" naphtha is being "reformed" to improve the octane number of gasoline, the production of cracked gas has been increasing even more rapidly than has the use of cracking. Gas from cracking today amounts to 7-8% by weight of the total crude run in this country.

Direct Utilization of Gas Constituents

While a substantial percentage of butanes and butenes are almost always present in refinery gas, attention should be called to the fact that in an up-to-date refinery about


HYDROCARBONS IN TYPICAL CRACKED GAS
WITH BOILING POINTS AND APPROXIMATE PERCENTAGES
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UNSATURATED 18.7 %
C1 36.0 %
METHANE CH4 -259 °F 36.0 %
C2 21.5 %
ETHANE C2H6 -127 °F 15.7 %
ETHENE C2H4 -155 °F 5.8 %
C3 29.8 %
PROPANE C3H8 -44 °F 19.3 %
PROPENE C3H6 -54 °F 10.5 %
N-BUTANE C4H10 31 °F 4.3 %
BUTENE-1 C4H8 23 °F 1.4 %
C4 8.2 %
BUTENE-2 C4H8 34 °F 0.2 %
ISOBUTANE C4H10 14 °F 1.5 %
ISOBUTENE C4H8 20 °F 0.8 %

Chart showing average composition of cracking still gas

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75% of the total C_4 hydrocarbons, and about 80% of the normal butane, is put into gasoline, and that there is an increasing trend in this direction. While the C_4 hydrocarbons boil in the range of 14° to 39° F., they are quite soluble in gasoline and average gasoline contains in the neighborhood of 9% of these compounds. Since the butanes and butylenes are desirable from both the volatility and anti-knock standpoints, it is good refining practice to recover and put into gasoline as much as possible without danger of getting into trouble from too high vapor pressure.

Four principal factors are making possible the inclusion of more and more of the butanes in gasoline rather than in gas. These are: (1)—the general use of stabilizers and closer fractionation, which permits the better recovery of the butanes, and the substantial elimination of propane. For every gallon of the very volatile propane rejected it is possible to use about five gallons more of butane to attain a given final vapor pressure in the gasoline. (2) Methods of separating out and storing butane during the summer months for use in winter have been developed. (3) Since butylenes constitute a large proportion of the total C_4 cut, and since they can be polymerized very readily into high anti-knock gasoline, their elimination makes room for the inclusion of most of the butanes in gasoline. (4) Better design of automotive fuel systems minimizes the danger of vapor lock and permits the use of more volatile gasoline.

One of the most important and surprising new uses for compounds present in refinery gas is the employment of propane as a refining agent in the manufacture of lubricating oils. For the past 15 years refinery laboratories have almost searched Beilstein through to find selective solvents which would do a better job than sulfuric acid and other refining agents in removing the undesirable constituents from lubricating oils but in all their search they never found one which was of real value for removing more than two or three of these constituents. However, all this time in their own backyard were thousands of tons of the neglected gas propane which, when liquefied under pressure, had the amazing property of acting as an anti-solvent tending to remove every one of five undesirable constituents.

Propane owes its versatility as a precipitant largely to the fact that its solvent properties change rapidly over the convenient temperature range between its boiling point, −44° F. and its critical temperature, +212° F. For example, its density drops from 0.5 to 0.25 in this temperature range, and it really possesses the properties of a whole series of different solvents, any one of which can be obtained by raising or lowering the temperature and using enough pressure to keep it liquid.

Even more important from a volume standpoint are other growing uses of liquid propane—for example, as bottled gas for domestic and industrial fuel. The total consumption in these fields amounts to around 150,000,000 gallons yearly.

Raw Materials for Chemical Industry

This fascinating chapter in the American chemical industry had its real inception only about 18 years ago, when propylene in cracked gases was converted into isopropyl alcohol, a product which was then selling at prices up to $7 per gallon and enjoyed a modest demand as a substitute for ethyl alcohol on account of the many restrictions surrounding the use of the latter. Needless to say, this synthesis brought the price down very rapidly, until its price today is about one-twentieth of what it was and its uses have multiplied correspondingly. Ethylene dichloride and ethylene chlorhydrin, made by chlorinating ethylene resulted in a great cheapening of these reagents. The next important product to be made synthetically from cracked gas was ethylene glycol, beginning about 1922. At that time glycol was a chemical rarity. Its merits as an anti-freeze soon developed a mass market, and since then many other uses have been found—for example, nitroglycol is largely used in conjunction with nitro-glycerine, especially to make low-freezing explosives. The related compound, diethylene glycol or glycol ether is increasingly used as a glycerine substitute for the moistening of cigarette tobacco.

While glycol, ethyl alcohol and isopropyl alcohol are the three most important primary products synthesized from cracked gas, one company is making commercially more than 100 synthetic chemicals starting from ethylene, propylene and the butylenes, including at least 24 alcohols and alcohol ethers, 4 ketones, 23 esters, 14 amines, 8 ethers, 7 chlorinated compounds and many others. This is not the place to present anything like a complete catalog, but I shall endeavor to describe briefly the more important types of process and product.

The olefinic constituents of refinery gases are by far the most reactive and hence are the most important raw materials for chemical synthesis. The simplest reaction is the formation of various alcohols. Each of the principal olefins in refinery gas is being used commercially for the production of the corresponding alcohol. The synthetic plant capacity for making ethyl alcohol is equal to about half of the total industrial alcohol production of the country. However, less than half of the synthetic production finds its way into the industrial alcohol market, the larger portion being used as a raw material for other synthetic products.

An equally important general reaction of the olefins is that with chlorine in the presence of water. When chlorine is passed into cold water, part of it dissolves as such and part hydrolyzes to hydrochloric and hypochlorous acid, the equilibrium depending largely on the chloride ion concentration. The olefins add chlorine to form dichlorides, and hypochlorous acid to form the chlorhydrins. The dichlorides are useful as solvents, and the chlorhydrins are useful in many reactions, particularly hydrolysis to form the corresponding glycols.

Ethylene dichloride in particular is finding increasing use as one of the two principal raw materials in the making of rubber substitute and resins.

An interesting and important synthesis recently found to be possible from petroleum is that of glycerine, which can be made by the regulated chlorination of propylene followed by hydrolysis under certain special conditions. While the synthesis is not yet commercial, it is a real possibility in case the price of glycerine should skyrocket due to war demands.

The parafin hydrocarbons of course are not as reactive as the olefins and are not so widely used as chemical raw materials. For this reason the most important chemical use of the paraffinic gases has been to convert them into olefinic gases either by cracking or by catalytic dehydrogenation. Thus, most of the chemical compounds synthesized from refinery gas are actually made by cracking propane or propane plus propylene to give a cracked gas with high concentrations of propylene and ethylene. Catalytic dehydrogenation can be made to give even better yields of the desired olefins. Butylene can also be dehydrogenated to butadiene, and this in turn polymerized into the familiar "Buna" rubber.

Chlorination can of course be applied to the paraffinic hydrocarbons. Propane is commercially chlorinated to form a moderate yield of the 1:3 dichlor propane, which is separated and converted into the important new anaesthetic cyclopropane by the use of zinc dust.

An interesting new development is the vapor phase nitration of the gaseous paraffin hydrocarbons with the oxides of nitrogen to form the nitro paraffins. It is understood that a commercial plant is now being built.

The principal chemical use for methane today outside of its conversion into carbon black and related blacks, is the production of fairly cheap hydrogen by heating it with steam to around 1600° F. in the presence of a catalyst. However, it now appears that hydrogen can be made more cheaply in an oil refinery by the catalytic dehydrogenation of either naphtha or of propane and butane. Another use of methane is its oxidation and synthesis into a series of straight chain olefins boiling mainly in the gasoline range. Unfortunately, these hydrocarbons knock badly but they do furnish a cheap source of straight chain olefins between C_2 and, say C_{12} which can readily be separated for chemical

When the Cross cracking unit (above left) was placed in operation in 1922 it was the most efficient type of cracking equipment known.

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GASOLINE ANTIOXIDANTS

purposes or hydrogenated to paraffins for special uses where a highly paraffinic naphtha is desired.

The principal non-hydrocarbons present in cracked gas are hydrogen and hydrogen sulfide. Hydrogen generally runs 3-5% but cannot be separated economically. While the H_2S is mainly regarded as a nuisance, it can be absorbed and concentrated by the use of a variety of solvents, some of which are made from refinery gas. The recovered H_2S can readily be converted into sulfuric acid or finely divided sulfur.

Heavier Hydrocarbons from Gas

While the above-mentioned synthetic processes are of great importance to the chemical industry, they are not so important to the economics of the petroleum industry because the total amount of refinery gases available is hundreds of times as large as the chemical industry is likely to need for some time to come. Far more important to the petroleum industry are certain new processes, principally polymerization processes, which make it possible to convert a large part of the refinery gases into gasoline of unusually high quality. In a sense these processes are the reverse of cracking, as they cause the relatively small gas molecules to recombine into medium-size molecules suitable for gasoline.

Since the demand for these polymer gasolines (of around 85 octane) is almost unlimited, such processes are bound to be adopted rather generally. As a matter of fact, around 600,000 gallons of such gasoline are being synthesized every day by polymerization plants already operating in the country.

Possibly even more important, from the standpoint of our national welfare are a series of selective processes which start by separating out certain relatively pure hydrocarbons from the refinery gases and causing them to combine to make certain hydrocarbons of a composition especially suited for use in 95 to 100-octane aviation gasoline.

The first processes for making high octane blending stocks took advantage of the fact that iso-butylene polymerized more readily than any of the other gaseous hydrocarbons and accordingly a C_4 cut could be polymerized either with 70% sulphuric acid at ordinary temperatures or with phosphoric acid catalyst at moderately elevated temperatures to form di-iso-butylene. This in turn could be hydrogenated by either high or low pressure processes to form fairly pure iso-octane. Subsequently it has been found that by the use of similar acid at temperatures around 175° F. it was possible to form a co-polymer of iso-butylene and butylene, which gives about twice as much polymer which can be hydrogenated to give an aviation fuel of almost as good characteristics as iso-octane. However, both of these two-step processes are being largely superseded by the alkylation process, which makes saturated hydrocarbons by the interaction of the butylenes with iso-butane and thus avoids the hydrogenation step.

Present installed alkylation plant capacity is around 400,000 gallons per day of these high octane blending stocks and it is being augmented rapidly.

Iso-butylene is particularly interesting as a special example of the possibilities of polymerization. Under different conditions and with different catalysts, iso-butylene can be polymerized to:

(1) Iso-octene, a very high anti-knock gasoline;

(2) High quality lubricating oil;

(3) Very viscous addition agents for lubricating oils to improve their viscosity characteristics and inhibit wax crystallization; and

(4) Hard brittle resins which have certain special uses.

As a matter of fact, by proper control of the polymerization of this one compound, it is possible to synthesize high quality substitutes for almost all ordinary petroleum products, and even go to products with molecular weights as high as 400,000.

The question of the probable cost of these various hydrocarbons at different locations is a difficult subject be-

cause it naturally varies greatly from point to point and is today very much in the process of flux. In general the cost of freight shipment is so high that it is better for a chemical plant planning to use large quantities to be located at the refinery. Unused tail gases and other by-products can generally be returned to the refinery as a credit against raw material cost.

A good general idea of the relative value of a given hydrocarbon can be obtained by reference to the chart. Methane in the upper lift is the most plentiful and the cheapest of all the hydrocarbons, and their value in general increases steadily as one moves down the table or to the right, with iso-butylene being probably the most valuable compound.

In general methane, ethane and ethylene are worth only fuel value at the ordinary refinery, which varies from 4c to 12c per million Btu., depending upon refinery location. Methane, with some ethane, is of course available at almost nominal cost by going directly to natural gas fields which are remote from pipe lines. Propane has a value somewhat greater than fuel value because it can be cracked or dehydrogenated to propylene and polymerized into gasoline, but very large quantities are still available in natural gasoline plants. Propylene of course occupies an intermediate position between propane and the butylenes as it can also be readily polymerized.

For reasons already set forth all the butanes and butylenes would be worth close to gasoline value if refineries were effectively isolated by distance or otherwise from cheap casinghead, but since all casinghead gas plants have an excess of butane and iso-butane, this tends to limit the value of the C_4 cut in most refineries. The relative value of butane and iso-butane also depends on local conditions—butane is more desirable for incorporation in gasoline as it has quite a little lower vapor pressure than has iso-butane; on the other hand, iso-butane is potentially quite valuable for utilization in the akylation process.

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New Patents

Compiled by R. E. Burnham, patent and trade-mark attorney, 511 Eleventh Street, NW, Washington, D. C., from whom copies may be obtained at rate of 25c each. State number of patent and name of inventor when ordering.

October 31, 1939

Refining petroleum oil in propane solution—C. P. McNeill, Whiting, Ind., assignor to Standard Oil Co. (Ind.) Filed Dec. 23, 1936. No. 2,177,734.

Conversion of hydrocarbons—L. C. Huff, Chicago, assignor to Universal Oil Products Co. Filed Nov. 30, 1936. No. 2,177,829.

Art of refining—E. J. Martin, East Chicago, Ind., assignor to Sinclair Refining Co. Filed June 19, 1935. No. 2,178,078.

Solvent refining—L. A. Clarke, Fishkill, N. Y., assignor to Texas Co. Filed Apr. 2, 1937. No. 2,178,321.

Method of dewaxing petroleum oils, and manufacture of low boiling hydrocarbon oils—L. G. Story, White Plains, N. Y., assignor to Texas Co. Filed Jan. 30, 1937. Nos. 2,178,328 and 2,178,329.

Method of recovering pyridine in solvent refining—J. W. Weir, Los Angeles, assignor to Edeleanu G.m.b.H., Germany. Filed May 28, 1937. No. 2,178,506.

Refining hydrocarbon oils—Ernst Terres, Germany, Josef Moos, New York, and Erich Saegebarth, Jackson Heights, N. Y., assignors to Edeleanu G.m.b.H., Germany. Filed Mar. 22, 1935. No. 2,178,515.

Diesel fuel—W. H. James, Paulsboro, R. C. Moran, Wenonah, and E. M. Nygaard, Woodbury, N. J., assignors to Socony-Vacuum Oil Co. Filed Oct. 14, 1937. No. 2,177,719.

Petrolatum—C. M. Loane, Hammond, Ind., assignor to Standard Oil Co. (Ind.) Filed Mar. 31, 1937. No. 2,177,729.

Diesel fuel—F. H. MacLaren, Calumet City, Ill., assignor to Standard Oil Co. (Ind.) Filed May 27, 1937. No. 2,177,732.

Mineral oil composition—H. G. Berger, Woodbury, and W. H. James, Wenonah, and D. E. Badertscher, Woodbury, N. J., assignors to Socony-Vacuum Oil Co. Filed Nov. 18, 1938. No. 2,177,923.

Manufacture of ethers from olefins—C. F. Oldershaw, Berkeley, Calif., assignor to Shell Development Co. Filed Dec. 27, 1937. No. 2,178,186.

Sulfurized cutting oil—W. H. Kobbe, New York, assignor to Texas Co. Filed Mar. 2, 1937. No. 2,178,325.

Diesel fuel—E. F. Pevere, Beacon, and W. N. Meyer, Newburgh, N. Y., assignors to Texas Co. Filed June 26, 1936. No. 2,178,327.

Motor fuel—I. E. Muskat, Barberton, Ohio, assignor to Pittsburgh Plate Glass Co. Filed Feb. 16, 1937. No. 2,178,403.

Mineral oil lubricant—J. M. Musselman, Cleveland, assignor to Standard Oil Co. (Ohio) Filed Oct. 14, 1937. No. 2,178,455.

Lubricating composition—C. F. Prutton, Cleveland, and A. K. Smith, assignors to Lubri-Zol Development Corp. Filed Dec. 4, 1934. No. 2,178,513.

Lubricating composition—C. F. Prutton, assignor to Lubri-Zol Corp. Filed Jan. 5, 1937. No. 2,178,514.

Lubricating oil—B. H. Lincoln and W. L. Steiner, Ponca City, Okla., assignors to Lubri-Zol Development Corp. Filed Feb. 15, 1936. No. 2,178,534.

November 7, 1939

Voltolization of mineral oils and products thereof—P. J. Gaylor, Elizabeth, N. J., assignor to Standard Oil Development Co. Filed Jan. 11, 1936. No. 2,178,769.

Process for producing valuable polymers from hydrocarbon gases—Raphael Rosen, Elizabeth, and R. M. Thomas, Union, N. J., assignors to Standard Oil Development Co. Filed July 15, 1936. No. 2,178,808.

Conversion of gaseous hydrocarbons—H. V. Atwell, White Plains, N. Y., assignor to Process Management Co. Filed Jan. 6, 1937. No. 2,178,824.

Process of treating hydrocarbon oils—J. W. Gray, Basking Ridge, N. J., and J. S. Walton, Elkton, Md., assignors to Gasoline Products Co. Filed Aug. 19, 1937. No. 2,178,834.

Treatment of hydrocarbons—W. E. Kuhn, Jackson Heights, N. Y., assignor to Texas Co. Filed June 15, 1937. No. 2,178,838.

Process for refining oil—S. E. Campbell, Long Beach, Calif. Filed Dec. 13, 1937. No. 2,179,008.

The following to Universal Oil Products Co., as assignee of the inventors:

Manufacture of diolefins—A. V. Grosse, Chicago. Filed Nov. 30, 1937. No. 2,178,584.

Manufacture of diolefins—J. C. Morrell, Chicago. Filed Nov. 30, 1937. No. 2,178,601.

Manufacture of diolefins—Morrell and Grosse. Filed Nov. 30, 1937. No. 2,178,602.

Conversion of hydrocarbon oils—J. G. Alther, Chicago. Filed May 12, 1938. No. 2,179,079.

Coking of hydrocarbon oils—Alther. Filed Mar. 31, 1936. No. 2,179,080.

Manufacture of ethers—Vladimir Ipatieff, Chicago. Filed Oct. 26, 1932. No. 2,179,092.

Lubricant—P. L. Salzberg, Carrcroft, Del., assignor to E. I. du Pont de Nemours & Co. Filed June 25, 1937. No. 2,178,610.

Preparation of anhydrides by use of ketene—A. H. Gleason, Elizabeth, N. J., assignor to Standard Oil Development Co. Filed Aug. 13, 1931. No. 2,178,752.

Purification of alkyl sulfates—E. V. Fasee and E. C. Rolfs, Jr., Baton Rouge, assignors to Standard Oil Development Co. Filed Nov. 29, 1935. No. 2,178,786.

Motor fuel—J. W. Jean, Pasadena, Calif. Filed Sept. 13, 1937. No. 2,179,151.

Manufacture of improved asphalts—R. E. Burk and C. H. Whitacre, Cleveland, assignors to Standard Oil Co. (Ohio). Filed Nov. 23, 1936. No. 2,179,208.

The following to Gulf Oil Corp., as assignee of the inventors:

Manufacture of lubricating compositions—H. G. Smith Wallingford, Pa. Filed Jan. 22, 1936. Nos. 2,179,060 and 2,179,061.

Manufacture of sulfo-halogenated mono-esters and improved lubricants containing same—Smith and T. L. Cantrell of Lansdowne, Pa. Filed June 9, 1936. No. 2,179,062.

Methods of making sulfurized sperm oils, and refining of oil compositions containing sulfurized fatty esters—Smith and Cantrell. Filed Sept. 28, 1936. Nos. 2,179,063 and 2,179,064.

Manufacture of sulfurized mono-esters of fatty acids—Smith. Filed Oct. 29, 1936. No. 2,179,065.

Manufacture of sulfurized sperm oil—Smith. Filed Oct. 29, 1936. No. 2,179,066.

Lubricant—Smith. Filed June 7, 1938. No. 2,179,067.

November 15, 1939

Production of liquid hydrocarbons—Mathias Pier, Germany, assignor to I. G. Farbenindustrie. Filed Sept. 19, 1936. No. 2,179,829.

Distillation of liquids having relatively high boiling points—Karl Sondermann, Germany, assignor to American Lurgi Corp., New York, N. Y. Filed Sept. 10, 1936. No. 2,179,833.

Refining of hydrocarbon oil with mixed solvents—J. W. Weir, Los Angeles, assignor to Edeleanu G.m.b.H., Germany. Filed June 8, 1936. No. 2,179,909.

Motor fuel production—George Armistead, Jr., Scarsdale, N. Y., assignor to Gasoline Products Co. Filed Oct. 23, 1937. No. 2,179,989.

Manufacture of low pour test lubricating distillates—H. G. Smith, Swarthmore, Pa., assignor to Gulf Oil Corp. Filed May 9, 1932. No. 2,180,070.

Catalyst regeneration—G. A. Boyd, Chicago, assignor to Standard Oil Co. (Ind.) Filed Oct. 13, 1937. No. 2,180,220.

Process for removing gum-forming and color-imparting bodies from cracked unsaturated hydrocarbon oils—R. C. Osterstrom, Chicago, assignor to Pure Oil Co. Filed Mar. 7, 1932. No. 2,180,324.

Lubricating oil—B. H. Lincoln and W. L. Steiner, Ponca City, Okla., and Alfred Henriksen, deceased, assignors to Lubri-Zol Development Corp. Filed July 5, 1934. No. 2,180,008.

Build Desulfurization Plant

Virginian Gasoline and Oil Co., Charleston, W. Va., is installing a Perco catalytic desulfurization unit at its Cobb plant. Capacity will be 1000 pounds per day. The plant will process alternately 12-pound natural gasoline and 68° A. P. I. gas well distillate. Pilot plant tests showed nearly complete removal of sulfur from these gasolines, it is reported. The new unit will be on stream early in 1940.

Makes Fuel Oil Consumption Record

Fuel oil consumption so low as to have undoubtedly set up a new world's standard for steamers of its class is reported following tests of the S. S. Red Jacket by the Navy Department. The Red Jacket is the second of six vessels to be built for the U. S. Maritime Commission by the Federal Shipbuilding and Drydock Co., Kearny, N. J. The ships are 459 feet long, 63-foot beam and have a displacement of 13,900 tons.

Fuel consumption per shaft horsepower for all purposes was found to be 0.545 pound of oil. The speed of the vessel, also, was regarded as remarkable since the guarantee of the shipbuilders was 15½ knots whereas a trans-Atlantic voyage was made at an average of 16.8 knots.

Steam is generated in two "D" type Foster Wheeler marine steam generators fitted with completely water cooled furnaces, cast iron extended surface type economizers, tubular air heaters and Todd oil burners.

Charles R. Houssierre, Jr., has joined the Bureau of Engineering Research of the University of Texas. He will study heaving shale formations of the Texas Gulf Coast oil fields under the direction of H. H. Power, professor of chemical engineering. Mr. Houssierre comes to the university from M.I.T.

OIL TRANSPORTATION

Competition Speeds Many Changes In Moving Oil To Markets

THIS ANNUAL TRANSPORTATION ISSUE of NATIONAL PETROLEUM NEWS tells of the 1939 developments in the transportation of petroleum and its products. Its articles emphasize the competition between the different means of transport that exist today for the business of moving oil and its products to markets.

This competition is increasing and its results are important to all marketers and bring oil products to the public at lower cost.

The oil industry is exceptional among all industries in the ownership of a vast transportation system for handling its own products exclusively. It has an investment of well over Two Billion in pipelines, tankers, barges, tank cars and transport and delivery trucks. Competition today is keener than ever among these transportation agencies of the oil companies themselves for the job of moving oil to markets. Today, also, the railroads are showing greater enterprise than in many years in their efforts to get some of the oil traffic back on their own lines.

Gasoline pipelines are now being extended to many new marketing areas, articles in this issue of NPN bring out, in their competition to secure the transportation of motor fuel and other refined products. By the summer of 1940, mileage of the gasoline lines will be more than 25 per cent greater than at the beginning of 1939.

However, these efficient agencies, the pipelines, for moving gasoline and other products to markets, are not supreme by any means. The extension of navigation on the waterways of the Mississippi, among other factors, is materially cutting into the volume of gasoline being moved today through the largest gasoline pipeline system in the country.

The developments in 1939 on the Mississippi Waterway, as well as in the movement of crude and refined products over other coastal and inland waterways in this country, are described in other special articles in this Transportation Number of NATIONAL PETROLEUM NEWS. These articles also tell of the building of water terminals by independent marketers, so they can take advantage of this lower cost of moving oil to markets. Barging to these terminals competes for oil traffic the railroads have heretofore enjoyed exclusively, or the railroads in conjunction with the gasoline pipelines, or in some cases for business the transport trucks have enjoyed.

In 1939 also, as is brought out in this Transportation Number, there became manifest a greater desire on the part of the railroads to get back some of the oil traffic they have been losing steadily for many years to other means of transportation. For a long time the railroads talked about losing oil business. Now they have set about to do something about it. Recently, one important middle western railroad system has proposed a reduction in oil freight rates amounting to an average of 0.6 cents a gallon on gasoline. It is too early yet to tell to what extent connecting roads will join in this voluntary effort to get oil business back to the railroads.

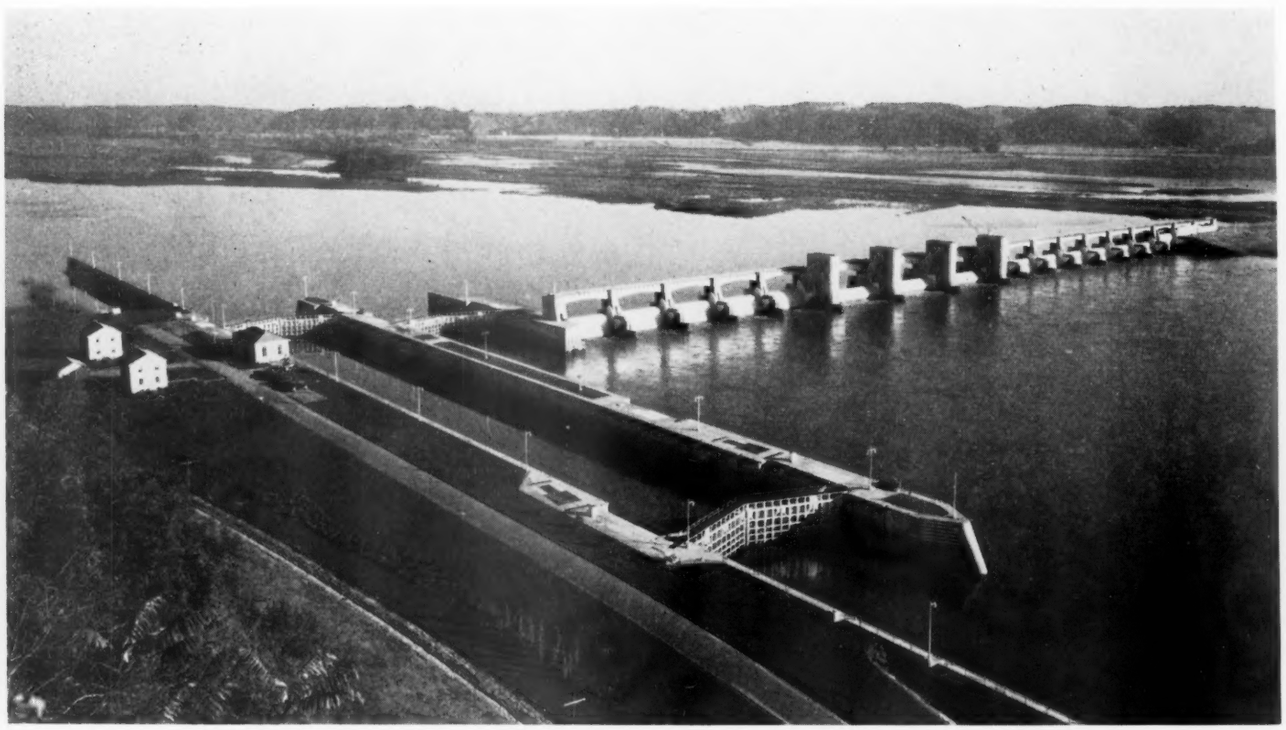
In the field of railroads transportation also, a group of 30 Independent refiners have a proposal before the Interstate Commerce Commission, asking that body to order the roads to reduce their freight rates in oil from the Mid-Continent. The refiners say this would enable them to reach again into wider markets in the middle west, from which they were forced by the competition of the gasoline pipelines and the waterways which other refiners could use.

Several hundred independent jobbers have supported the refiners' action, by appearing to testify on behalf of the lower rates sought, at hearings before an Interstate Commerce Commission examiner. These marketers thus showed their recognition of the importance of new developments in oil transportation methods on the future of their own businesses and the future of oil marketing generally.

Of even wider significance, the competition so in evidence today for the business of moving oil products to markets, it seems apparent, will tend to level out in time the present differences in cost of these various transportation methods in use today, the railroads, the gasoline pipelines, barging and transport trucking. Over a period, this competition, if it has the same economic effect that competition in any line of endeavor generally brings, will bring transportation costs to nearer the same level for all oil marketers doing business in any given area. In so doing, this competition will contribute greatly to the stability of the oil markets.

What is happening in the oil transportation field today prophesies other important developments to come in future months. In introducing its Annual Transportation Issue for 1939, the Editorial Staff of NATIONAL PETROLEUM NEWS also calls attention to its Oil Transportation News page appearing weekly, through which readers can keep posted on current developments in oil transportation.

Oil Barges Push Farther



Spreading across the Mississippi river near Dubuque, Ia., is Lock and Dam No. 11, one of 25 projects now nearing completion under supervision of the U. S. Engineers Corps, which will deepen the channel and make possible the movement of larger tows all the way from its mouth to Minneapolis and St. Paul, a distance of almost 2000 miles

FIVE times this past summer a towboat pushed barges loaded with refined oils approximately 200 miles up the muddy Missouri river from Kansas City to Omaha.

Movement of oil by barge—just stepping out late in 1938 on the upper stretches of the Tennessee and Cumberland rivers also really hit its stride this year on these tributaries of the Mississippi Waterway.

Thus in 1939 two new territories on the already vast but still expanding Mississippi river water transportation system, were included in the settled routine of barge hauling of petroleum products.

The discovery of two new oil fields in 1939 also added to the possibility of further expansion of barge operations on the Mississippi Waterway. One of the fields is in Yazoo county, Mississippi, only 30 to 40 miles from the Mississippi river. The other is in the southeastern corner of Nebraska, only a few miles from the Missouri river.

In the event these fields are found to contain sufficient oil reserves it would be a relatively simple and inexpensive proposition to get either the crude or refined products to water for further movement to markets in barges.

Along the older sections of the Mississippi river and its navigable tributaries the business of moving petroleum and its products in barges developed further in 1939.

True enough there were times this summer when the movement slowed down occasionally for a few days because of the exceptionally low river stages resulting from subnormal rainfall in much of the system's watershed.

The river stage at Cairo, Ill.—where the Ohio empties into the Mississippi—early this fall, for example, was 4.7 feet. That is lower than it has been in many a year. Then at the "bottle neck" at Chain of Rocks, a few miles above St. Louis, there were a few traffic tie-ups resulting from tows going aground while trying to squeeze through the narrow channel at that point.

The shippers of petroleum products by barge met these conditions, however, by merely loading the vessels to shallower depths. Instead of loading

Up Mississippi Waterway

to 7 to 8 feet, they loaded to 4 and 5 feet and made more frequent trips.

The U. S. Engineers Corps also aided in a few instances by releasing into the streams, particularly into the dam controlled Ohio, some of the water that had been trapped in flood control reservoirs.

So the business of transporting oils by water on the vast Mississippi Waterway moved along at a fairly uniform rate, with indications that the volume would show about the same percentage gain in 1939 over 1938 as the 1938 movement showed over that in 1937.

The total gasoline movement in 1938 on the Mississippi and its tributaries, according to figures now being prepared for publication by the U. S. Engineers Corps, was 52,629,000 barrels, as compared with 46,760,000 barrels in 1937.

The movement of crude on this vast waterway also is expected to show a sizable increase in 1939 due to the fact that several companies now are bringing crude from the new Illinois and Indiana fields to the Ohio river for barge movement to refineries.

The larger oil companies have set the pace in the swing to water transportation on this vast inland waterway system; but they have not had the field entirely to themselves.

An accompanying map and list of terminals, as supplied by the U. S. Engineers Corps, shows the present status as far as refinery sources of supply and water terminals on the Mississippi and its tributaries are concerned.

A study of the map shows there are a number of independent refiners in addition to the major ones who are availing themselves of water transportation, and who accordingly have the facilities to serve their customers.

It also will be noted from the map and list that a number of independent marketers already are using this lower cost method of getting their products to destination.

The potential sources of supply to the Mississippi Waterway are not limited, however, to refineries located directly on the Mississippi and its tributaries.

The Intracoastal canal along the Gulf coast provided a convenient and sheltered link between Texas Gulf coast refiners and the mouth of the Mississippi. This link is being used extensively.

The new "Sohio," diesel powered, propeller driven towboat, was christened Nov. 15 and placed in the gasoline towing fleet of the Standard Oil Co. of Ohio, to operate on the Ohio river. It has a V-type hull, is of steel construction throughout, and has a loaded draft of 6 feet, 4 inches. The insulated superstructure includes a lounge, mess, galley, bath and double cabin aft; four double cabins and locker room forward; a "Texas" with lavoratory and two beds, and a pilot house

Several of the larger refiners in both the Beaumont and Houston refining districts use the canal to reach the Mississippi in order to move their products a distance up that system to their own distributing terminals.

Some independent refiners, particularly those in the Houston-Texas City district, ship to marketers on the Mississippi Waterway.

The refiners in the Corpus Christi refining district also are potential sources of supply but the Intracoastal canal has not been completed to that point, hence movement from their plants would have to be in deep water tankers which would have to be unloaded at some deep water terminal along the Gulf or lower Mississippi for transfer to barges.

Then there is the Arkansas Fuel Oil Corp., which has a pipeline from its Shreveport, La., refinery to Port Naches, Tex. Products are moved through the line to tidewater and then by barge through the Intracoastal canal to distributing points along the

Gasoline barges many times make only part of a tow. Here is one at the head of a mixed freight tow of 11 barges being eased into the locks at Louisville, Ky., on the Ohio river. This tow had to be broken and locked through in two sections

Mississippi Waterway and to other points in the southeast.

In an exhibit presented at a recent rail rate reduction proposal hearing, it was stated that this pipeline from Shreveport to Port Naches was moving in excess of 800 cars of gasoline a month to tidewater, "from whence it moves by tanker and barge, finding destination largely in the southeast."

The Lion Oil Refining Co., at El Dorado, Ark., is stepping up the use of its 14-mile pipeline from the refinery to a loading dock on the Ouachita river, from whence it barges products via the Mississippi Waterway to several of its distributing points in the south and southeast.

The company also is loading periodically a barge of a New Madrid, Mo., marketer who has his own equipment consisting of a shallow draft barge and a small towboat. This marketer operates on a schedule calling for a round trip approximately every two weeks. He has to be moved down the Ouachita river to the Black river, thence into the Red river and finally into the Mississippi, only a short distance above Baton Rouge, La.

Barges and Tows Both Owned and Leased

Most of the major companies using water transportation own their own barges and towboats. Other companies own their barges but have them moved by a barge line company boat operating on a regular schedule, or by contracting with a private towboat owner. Still others lease the barges and have them moved either by the barge line companies or private boat owners.

A marketer or refiner who desires to try water transportation, provided he is so situated that he can effect a savings in freight by that method, can buy his own barges, or he can lease them for several trips or for a single trip.

One company operating extensively on the Ohio river recently bought three new barges. On the basis of the cost of these barges, it is estimated that present cost of a modern barge is $2.40 to $2.50 per barrel of its capacity. Thus a 10,000 barrel barge would cost between $24,000 and $25,000.

There is some variation in lease price for barges, depending on such factors as availability of equipment, type of equipment on the barge and its size.

Most recent quotations obtainable indicate a price range of $15 to $25 a day for barges. The lessee of the barge must pay that rate not only while the barge is moving to destination with its load, but also while it is being returned to starting point unless some arrangement can be worked out with the barge owner for re-leasing it in the vicinity of the point where it discharges its cargo.

Barge movement upstream is at the rate of 3 to 4 miles an hour, depending upon the number and size of the barges and the power of the towboat. Such variables as river stages and fogs cause some tie-ups at nights. Downstream movement is at the rate of approximately 6 to 8 miles an hour.

A roundtrip from New Orleans to St. Louis, for example, requires approximately 22 days, while a round trip with Pittsburgh as destination requires approximately 30 days.

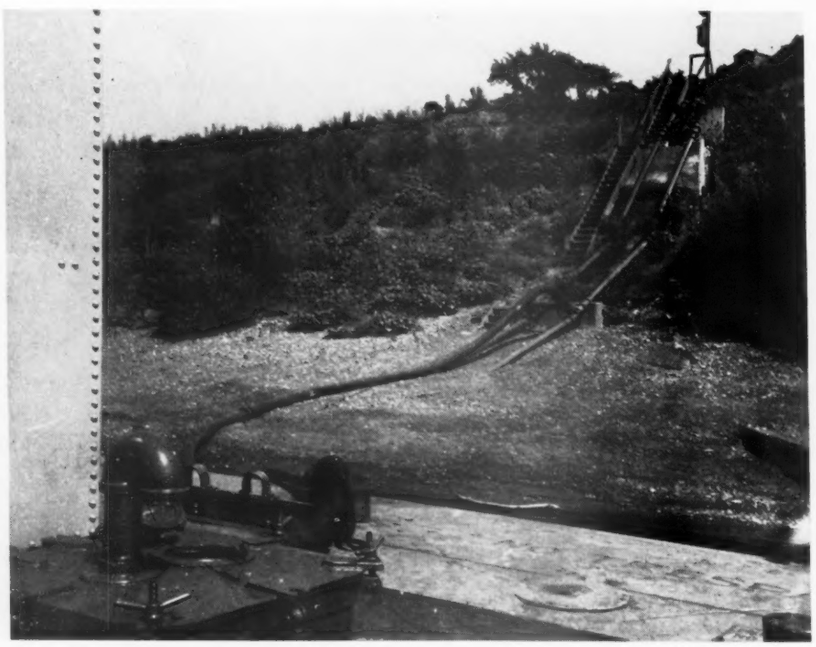
In the accompanying table is the schedule, by days, of one of the larger barge line companies between New Orleans and St. Louis.

Assuming that a barge can be leased for $20 a day, a refiner or marketer accordingly can get a rough estimate of the rental cost of the barge for a given trip by dividing the river mileage between origin and destination by 90 (miles traveled upstream per day); then dividing the mileage by 180 (miles per day downstream) and adding the two quotients and multiplying their sum by 20, the cost of the barge per day.

Referring again to the table, it will be seen that a round trip from New Orleans to St. Louis requires 22 days. The total rental cost for a barge for such a trip accordingly would be $440. Assuming the barge transports 10,000 barrels of gasoline, the rental cost of the barge per barrel would be 44 cents, or just slightly over 1 cent per gallon. This calculation, however, does not take into account any delays that might occur. The lessee of the barge would have to pay his daily rental regardless of the delays.

Where an oil company owns its own barges, towing usually is done on a contract basis. Reports from oil companies who use this method indicate that the towing cost, even for a distance as great as from New Orleans to Pittsburgh, is approximately 1.50 cents per gallon.

Oil terminals on the Mississippi Waterway range from elaborate layouts to very simple plants, consisting of a few storage tanks on the river bank with one or two unloading lines down to water edge. Many of the barges are equipped with discharge pumps but others are not and in most instances even small terminals have a pump available for lifting the cargo from the barge to the storage tanks.



Flexibility is required in connecting barge pipelines with shore lines, due to the constantly changing level of the river. This flexibility is obtained by using sections of large diameter rubber hose, particularly where no dock is provided and where the storage tanks are some distance from the bank, the only connection available at the water's edge being a pipeline over the edge of the bank, such as the one shown here

160 Oil Terminals On Miss. Waterway

There are at present approximately 160 terminals on the Mississippi Waterway, according to latest reports of the U. S. Engineers Corps.

The Ohio river portion of the Waterway leads all other sections with approximately 90 terminals in its 980 miles of river. That is an average of one terminal for every 11 miles.

On the Mississippi river section from Cairo, Ill., to the mouth there is an average of one terminal for every 44 miles of river. On the river from Cairo to Minneapolis there is an average of one terminal every 57 miles.

For the Mississippi river proper, from Minneapolis to its mouth, there is an average of one terminal for every 48 miles of river.

A permit from the U. S. War Department must be issued before a terminal can be built on any navigable

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Refineries and Oil Terminals

This list also includes refineries located on the Gulf Coast which are in a position to ship via the Mississippi and its tributaries and refineries and distributing terminals located on this waterway. The list was obtained from permit records of the U. S. Engineers office.

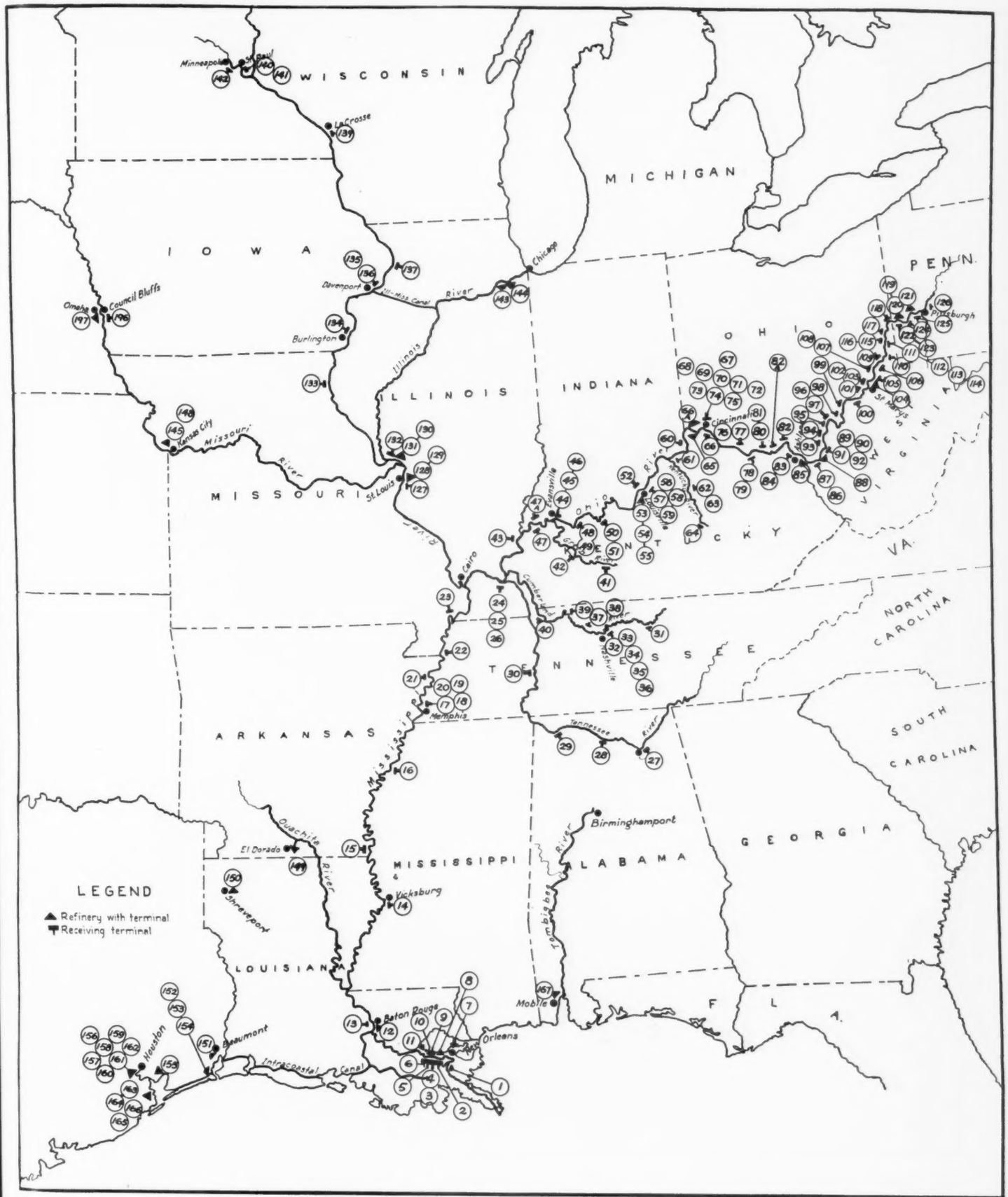
Chicago district refineries are not shown, although these plants can reach the Mississippi Waterway by way of canals and the Illinois river, but as far as is known do not ship via the Mississippi waterway.

Refineries are shown in black face type. The numbers show the locations of refineries and terminals on the accompanying map.

Circle Number	Company	Location
1	**Chalmette Petroleum Corp.**	Port Chalmette, La.
2	Gulf Refining Corp.	Gretna, La.
3	General American Tank Storage Co.	Westwego, La.
4	Sinclair Refining Co.	Westwego, La.
5	The Texas Corp.	Marrero, La.
6	Southport Petroleum Co.	Avondale, La.
7	Standard Oil Co. of Louisiana	New Orleans, La.
8	**Pan American Petroleum Corp.**	Destrehan, La.
9	General American Tank Storage Co.	Good Hope, La.
10	Cities Service Oil Co.	St. Rose, La.
11	**Shell Petroleum Co., Inc.**	Norco, La.
12	**Standard Oil Co. of Louisiana**	Baton Rouge, La.
13	The Texas Corp.	Sunrise, La.
14	Standard Oil Co., Kentucky	Vicksburg, Miss.
15	Standard Oil Co. of Louisiana	Grand Lake, Ark.
16	Mid-South Oil Co. of Tennessee	Friars Point, Miss.
17	Standard Oil Co. of Louisiana	Memphis, Tenn.
18	Lion Oil Refining Co.	Memphis, Tenn.
19	Pan American Petroleum Corp.	Memphis, Tenn.
20	Gulf Refining Co.	Memphis, Tenn.
21	Shell Petroleum Co., Inc.	Osceola, Ark.
22	Tennessee Oil Co.	Heloise, Tenn.
23	Simpson Oil Co.	New Madrid, Mo.
24	Standard Oil Co., Kentucky	Paducah, Ky.
25	Gulf Refining Co.	Paducah, Ky.
26	Shell Oil Co., Inc.	Paducah, Ky.
27	Gulf Refining Co.	Guntersville, Ala.
28	Gulf Refining Co.	Decatur, Ala.
29	Gulf Refining Co.	Sheffield, Ala.
30	Gulf Refining Co.	Perryville, Tenn.
31	Gulf Refining Co.	Carthage, Tenn.
32	Standard Oil Co. of Louisiana	Nashville, Tenn.
33	Pan American Petroleum Corp.	Nashville, Tenn.
34	Gulf Refining Co.	Nashville, Tenn.
35	Shell Oil Co., Inc.	Nashville, Tenn.
36	Apex Oil Co.	Nashville, Tenn.
37	Drawn Bros.	Ashland City, Tenn..
39	Standard Oil Co. of Louisiana	Clarksville, Tenn.
40	Apex Oil Co.	Dover, Tenn.
41	Gulf Refining Co.	Bowling Green, Ky.
42	Gulf Refining Co.	South Carrolton, Ky.
43	Ill. Farm Supply Co.	Shawneetown, Ill.
44	Koch Sand & Gravel Co.	Evansville, Ind.
45	Gulf Refining Co.	Evansville, Ind.
46	Standard Oil Co. (Indiana)	Howell, Ind.
47-A	Standard Oil Co. of Ohio	West Franklin, Ind.
47	Home Oil Terminal Co.	Henderson, Ky.
48	Foardsville Pipelines (Crude)	Henderson, Ky.
49	Producers Pipeline Co. (Crude)	Henderson, Ky.
50	Standard Oil Co., Kentucky	Owensboro, Ky.
51	Gulf Refining Co.	Owensboro, Ky.
52	Lowell G. Ash	New Albany, Ind.
53	**Aetna Oil Co.**	Louisville, Ky.
54	**Stoll Oil Refining Co.**	Louisville, Ky.
55	**Louisville Refining Co.**	Louisville, Ky.
56	Continental Oil Co.	Louisville, Ky.
57	Kentucky Consumers Oil Co.	Louisville, Ky.
58	Gulf Refining Co.	Louisville, Ky.
59	Standard Oil Co. Inc., Kentucky	Louisville, Ky.
60	Guarantee Oil Co.	Aurora, Ind.
61	Gulf Refining Co.	Carrollton, Ky.
62	Power Oil Co.	Frankfort, Ky.
63	Gulf Refining Co.	Frankfort, Ky.
64	Gulf Refining Co.	Camp Nelson, Ky.
65	**Standard Oil Co. of Ohio** (via p.l.)	Bromley, Ky.
66	Gulf Refining Co.	Newport, Ky.
66-A	**Gulf Refining Co.**	North Bend, O.
67	Keenan Oil & Fuel Co.	Cincinnati
68	Cumberland Terminal Sales, Inc.	Cincinnati
69	Ohio River Co.	Cincinnati
70	Pure Oil Co.	Cincinnati
71	Tower Oil Co.	Cincinnati
72	Tresler Oil Co.	Cincinnati
73	Ohio River Refg. & Terminal Co.	Cincinnati
74	Sun Oil Co.	Cincinnati
75	American Waterways, Inc.	Cincinnati
76	Pure Oil Co.	Ripley, O.
77	Ripley Oil Co.	Ripley, O.
78	Ashland Refining Co.	Maysville, Ky.
79	Standard Oil Co., Kentucky	Maysville, Ky.
80	Pure Oil Co.	Manchester, O.
81	Standard Oil Co. of Ohio	Manchester, O.
82	Standard Oil Co. of Ohio	Corryville, O.
82-A	Standard Oil Co. of Ohio	Portsmouth, O.

Circle Number	Company	Location
83	Standard Oil Co., Kentucky	Ashland, Ky.
84	Ashland Refining Co.	Ashland, Ky.
85	**Ashland Refining Co.**	Catlettsburg, Ky.
86	Ashland Refining Co.	Kenova, W. Va.
87	Sun Oil Co.	Kenova, W. Va.
88	**Elk Refining Co.**	Huntington, W. Va.
89	Gulf Refining Co.	Huntington, W. Va.
90	Sterling Oil Co.	Huntington, W. Va.
91	Standard Oil Co. of Ohio	Huntington, W. Va.
92	Pure Oil Co.	Huntington, W. Va.
93	Standard Oil Co. of Ohio	Crown City, O.
94	Standard Oil Co. of Ohio	Gallipolis, O.
95	Standard Oil Co. of Ohio	Middleport, O.
96	Southern Oil Co.	Minersville, O.
97	Excelsior Oil Co.	Minersville, O.
98	Southern Oil Co.	Portland, O.
99	Standard Oil Co. of Ohio	Long Bottom, O.
100	Gulf Refining Co.	Parkersburg, W. Va.
101	**National Refining Co.**	Marietta, O.
102	Sun Oil Co.	Marietta, O.
103	Pure Oil Co.	Marietta, O.
104	**Quaker State Oil & Refining Co.**	St. Marys, W. Va.
105	Sterling Oil Co.	St. Marys, W. Va.
106	Gulf Refining Co.	New Martinsville, W. Va.
107	Sterling Oil Co.	Grandview, O.
108	Standard Oil Co. of Ohio	New Matamoras, O.
109	Standard Oil Co. of Ohio	Clarington, O.
110	Standard Oil Co. of New Jersey	Moundsville, W. Va.
111	Standard Oil Co. of New Jersey	Wheeling, W. Va.
112	Gulf Refining Co.	Wheeling, W. Va.
113	American Oil Co.	Wheeling, W. Va.
114	Sun Oil Co.	Wheeling, W. Va.
115	Standard Oil Co. of Ohio	Martins Ferry, O.
116	Quaker State Oil & Refining Co.	Martins Ferry, O.
117	Standard Oil Co. of Ohio	Steubenville, O.
118	American Oil Co.	East Liverpool, O.
119	**Freedom Oil Works Co.**	Freedom, Pa.
120	**Sun Oil Co.** (via pipeline)	Vanport, Pa.
121	**Gulf Refining Co.**	Neville Island, Pa.
122	Burrell Oil Co.	Monoca, Pa.
123	Standard Oil Co. of Pa.	Midland, Pa.
124	Republic Oil Co.	Coraopolis, Pa.
125	Socony-Vacuum Oil Corp.	McKees Rocks, Pa.
126	American Oil Co.	Pittsburgh, Pa.
127	Alton & Southern Railway	East St. Louis, Ill.
128	**Socony-Vacuum Oil Corp.**	St. Louis
129	**Phillips Petroleum Co.** (Pipeline)	East St. Louis, Ill.
130	**Shell Oil Co. Inc.**	Wood River, Ill.
131	**Standard Oil Co. of Indiana**	Wood River, Ill.
132	Shell Oil Co. Inc.	Alton, Ill.
133	Ayres Oil Co.	Canton, Mo.
134	Stang Engineering Service Co.	Burlington, Ia.
135	Socony-Vacuum Oil Corp.	Bettendorf, Ia.
136	Shell Oil Co. Inc.	Bettendorf, Ia.
137	Smith & Finnegan	Fulton, Ill.
139	Wadhams Oil Co. (Socony-Vacuum)	La Crosse, Wis.
140	Shell Oil Co. Inc.	St. Paul, Minn.
141	Socony-Vacuum Oil Corp.	St. Paul, Minn.
142	Western Oil & Fuel Co.	Minneapolis
143	**The Texas Corp.**	Lockport, Ill.
144	**Globe Oil & Refining Co.**	Lemont, Ill.
145	**Socony-Vacuum Oil Corp.,** (via p.l.)	Kansas City
146	Socony-Vacuum Oil Corp.	Council Bluffs, Iowa
147	**Searle Petroleum Co.**	Omaha, Neb.
148	**Phillips Petroleum Co.**	Kansas City, Mo.
149	**Lion Oil Refining Co.** (via p.l.)	El Dorado, Ark.
150	**Arkansas Fuel Oil Corp.** (via p.l.)	Shreveport, La.
151	**Magnolia Petroleum Co.**	Beaumont, Tex.
152	**Gulf Refining Co.**	Port Arthur, Tex.
153	**The Texas Corp.**	Port Arthur, Tex.
154	**Pure Oil Co.**	Smiths Bluff, Tex.
155	**Humble Oil Refining Co.**	Baytown, Tex.
156	**The Texas Corp.**	Houston, Tex.
157	**Shell Oil Co. Inc.**	Houston, Tex.
158	**American Petroleum Co.**	Houston, Tex.
159	**Crown Central Petroleum Co.**	Houston, Tex.
160	**Sinclair Refining Co.**	Houston, Tex.
161	**Eastern States Petroleum Co.**	Houston, Tex.
162	**Maritime Oil Co.**	Houston, Tex.
163	**Pan American Petroleum Corp.**	Texas City, Tex.
164	**Republic Oil Refining Co.**	Texas City, Tex.
165	**Stone Refining Co.**	Texas City, Tex.
166	**Southport Petroleum Co.**	Texas City, Tex.
167	**Coastal Petroleum Corp.**	Mobile, Ala.

On Mississippi and Tributaries



Located by number on the map are refineries which ship gasoline and other products via the Mississippi Waterway; also terminals of oil marketing companies which receive products by water shipment. Key to the numbers is on the page opposite. The list was taken from U. S. Army Engineers Corps records

stream. Application first must be filed with the U. S. Engineers Corps in the district in which the terminal is to be constructed.

The district engineer in charge passes on the permit, then sends it to the division engineer who in turn sends it to the War Department at Washington, along with his recommendations.

It is advised, therefore, that any refiner or marketer who plans to build a terminal consult the proper officer in the U. S. Engineers Corps handling that division of the river before a site is selected.

Sometimes there are certain restrictions which will prohibit the construction of a terminal on the site selected and considerable delay may be caused before a permit can be obtained for construction at a new site.

Docks at terminals range from a few pilings for the mooring of barges to very elaborate floating barges, on which are placed the various equipment used for handling products from barges.

Docks must be so constructed that there is no possibility of steel scraping against steel or concrete so that a spark might be caused which could ignite oil vapors. The docks must have proper lights at a specified height and at specified places on the piers.

The amount of oil in a loaded barge is always ascertained two times, once just as it is loaded, and again when it reaches destination. The man at the left has just "strapped" a compartment to determine the depth of the liquid in inches. The man in the center is reading the temperature of the liquid. The man at the right, referring to his tank table and temperature correction chart, is determining the number of barrels or gallons of liquid in the compartment

River Oil Barges Being Modernized

A few innovations in barge construction were noted in 1939. The low river stages on the Mississippi Waterway probably was responsible for the trend toward construction of wider barges which require a shallower loading depth but which will carry approximately as much as the older type barges which had to be loaded to almost channel depth in order to carry a full cargo.

One company eliminated $2000 worth of piping and valves by leaving large openings in the bottom parts of the partitions between the eight compartments and installing a deep well pump at the lowest point in the barge. This method naturally would prevent the carrying of more than one product at a time, but it would be a comparatively simple operation to close the partition openings and install the necessary piping in the event the barge should be required at a later date for handling mixed cargoes.

These barges also were equipped with valves to permit water to flow into the collision bulkheads at each end of the barge. Thus when a cargo is being discharged a water valve is opened. Being below the water line the valve permits water to fill the bulkhead, causing a tilting of the barge so the cargo will flow toward the pump.

As the barge is unloaded it naturally rises and by the time the cargo has been discharged the water valve, closed after the bulkhead has been filled, is well above the water line. The valve is opened and the water allowed to flow out of the bulkhead.

One of two barge builders have been putting the piping below deck. This precludes any accidental breaking of the lines, but might cause some additional expense in the event a line does break below deck, because the barge must be steamed out to remove vapors before repairs can be made.

Some of the new towboats are quite elaborate pieces of equipment. They have excellent quarters for the crew, and the most modern type and powerful diesel engines. One tow boat placed in service in recent months on this waterway is air conditioned.

The work of making more of nation's inland streams navigable is continuing as steadily as Congressional appropriations will permit. There already are on the books authorized waterway projects which will cost about $230,000,000 to complete and Congress will be asked at the next general session for additional funds.

One of the largest projects now nearing completion is the Fort Peck dam, on the Missouri river up in Montana, where the stream is just beginning to get to the status of a fair sized river.

This dam, say the U. S. Engineers, will store up water during the winter and spring, so that a more uniform flow can be provided for navigation during the summer months.

Completion of the project is expected to open up to barge transportation a sizable portion of the Missouri river, above the present head of navigation at Omaha.

The mammoth project calling for 26 dams on the Mississippi river is almost completed. The main problem now on that stream is to eliminate the bottle neck at the Chain of Rocks above St. Louis, and it already has been proposed that a canal be built around that narrow stretch of the river.

A new type floating dock has been designed and placed in service recently by a company active in water transportation of oil on the Ohio river. The three air-tight drums are fastened to a framework of pipe anchored on the bank so the drums can rise or fall with the changes in the river stage. A narrow "cat-walk" provides access to the barge and also carries the loading and unloading lines

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the holiday season rolls around with a new note of good-will and optimism.
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we wish our many friends in the petroleum industry the happiest of Christmases.
ONCE MORE . . .
we express our hope that the year before us will see your hopes gratified to the fullest degree.
AND ONCE MORE . . .
we thank our friends for their *overwhelming* acceptance of Paraflow and we promise that, in 1940, our efforts to serve you will be even further extended.
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2 New Marine Terminals

FAYETTEVILLE

"REPUBLIC" announces the opening of another new marine terminal, located on the Cape Fear River at Fayetteville, North Carolina. "REPUBLIC'S" High Grade Petroleum Products will be transported by barges from Wilmington, N. C. This new terminal assures more Independent Jobbers at many inland markets in North Carolina, South Carolina and Tennessee an economical, convenient source of supply for new "ROYALE REPUBLIC" Gasoline and all other "REPUBLIC" Superior Quality Products.

Only the best of modern equipment has been used in the construction of "REPUBLIC'S" Fayetteville Terminal. All trucks and tank cars are loaded through tested meters to insure accuracy.

"REPUBLIC" invites Oil Marketers to inspect this new terminal. It will be open twenty-four hours a day for your convenience.

TAMPA

Another large deep water terminal is now being constructed at Tampa, Florida. Independent Marketers throughout Western and Southern Florida will soon have a convenient source of supply for "REPUBLIC'S" Products brought direct by tankers from their modern refinery at Texas City, Texas. Announcement of the opening of the new Tampa, Florida terminal will be made during January, 1940.

"REPUBLIC'S" strategically located deep water and inland marine terminals on the Gulf and Atlantic Coasts, all supplied by ocean tankers and by barge, provide an adequate, economical and convenient source of supply to all Eastern and Southern marketers. "REPUBLIC" invites your inquiries.

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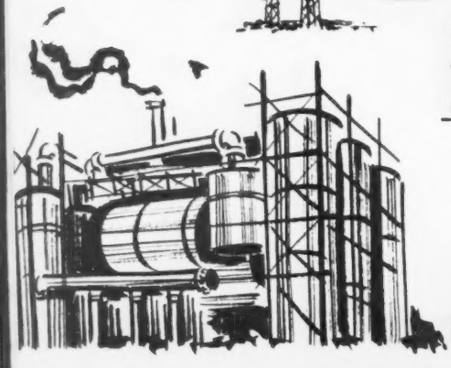
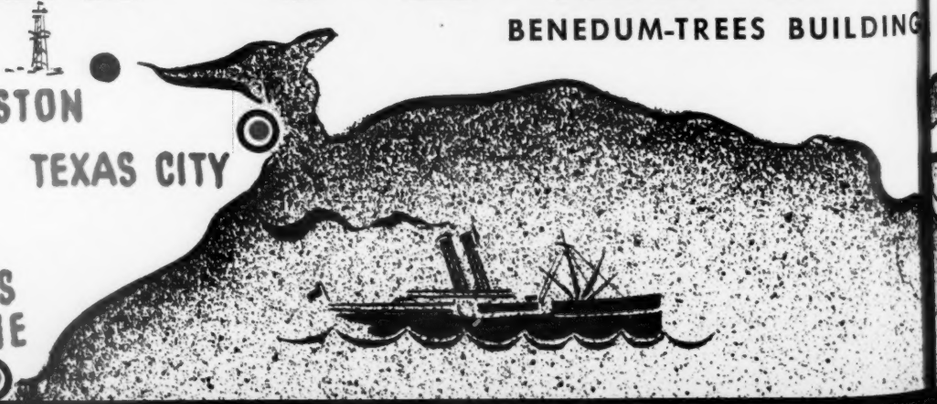


HOUSTON

TEXAS CITY

CORPUS CHRISTIE



REPUBLIC'S

Water TRANSPORTS and Added TERMINAL FACILITIES Make *New* "ROYALE REPUBLIC" GASOLINE Available to more INDEPENDENT JOBBERS

"REPUBLIC'S" refinery at Texas City, Texas is now being enlarged to meet the constantly increasing demand for their products. A new refining unit costing more than one million dollars is now under construction. This refinery has a daily capacity of well over 20,000 barrels of crude oil. Other improvements now under way, include the building of a large canning and drumming plant to meet the multiplying demand from both domestic and foreign markets for "REPUBLIC'S" refinery sealed products.

"REPUBLIC" is guaranteed a definite source for their crude oil requirements, being associated with the Benedum-Trees Interests, one of the largest Independent Producers.

Republic Oil Company and associated interests make a fully integrated organization, controlling its own oil wells, pipe lines, tankers, barges, refineries, natural gasoline plants, research laboratories, service stations and marketing organizations. More than seventy-five million (75,000,000) gallons of Petroleum Products are available through "REPUBLIC'S" Terminal facilities.

"REPUBLIC'S" Products and Service Facilities have gained, for "REPUBLIC," the reputation of *"THE INDEPENDENT SUPPLIER FOR THE INDEPENDENT JOBBER."*

Specialized Sales Promotion Assistants continuously offered by "REPUBLIC" helps the Independent Jobber increase Sales and Profits.

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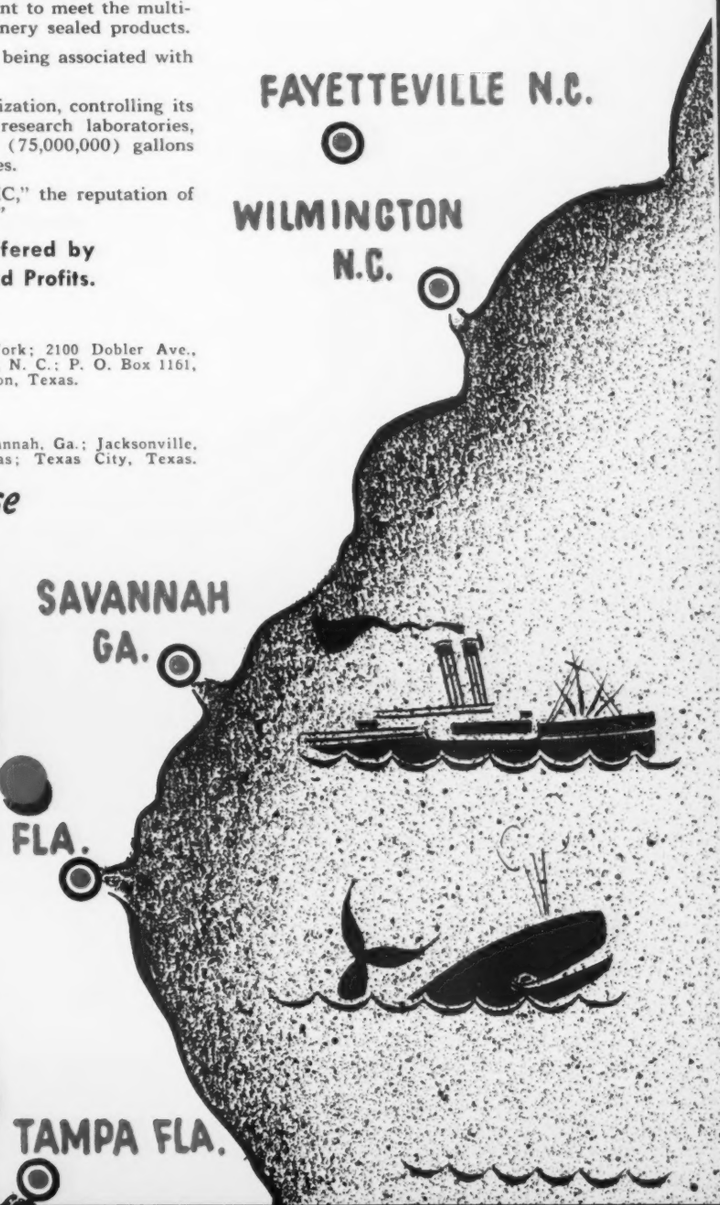


Gasoline Pipelines Built To New Market Centers

THE transportation of gasoline by pipeline from refineries to big marketing territories is growing rapidly.

Approximately 1900 miles of new gasoline lines, or extensions of existing systems, will be available by the middle of 1940. This includes lines laid in 1939, or started in 1939, construction to be completed by the end of 1940, or lines announced, to be built in 1940.

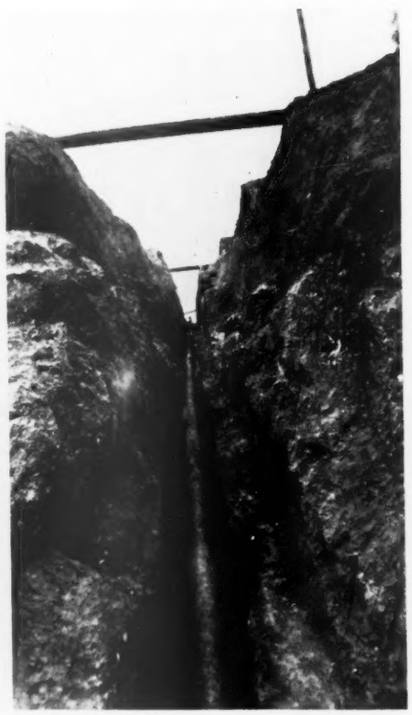
This 1900 miles of new gasoline line is equivalent to 29 per cent of the approximately 6650 miles of gasoline lines existing prior to 1939.

In 1938, the gasoline lines transported over 85,000,000 barrels of gasoline a good part of its way from refineries to consuming points. This was 16 per cent of the total domestic motor fuel demand of this country for that year, and the proportion will be considerably larger in 1939. This important part of the oil industry's own transportation system for its own products, has grown up almost in its entirety since 1930. In 1931, the U. S. Bureau of Mines reports that only about 12,500,000 barrels of gasoline moved by pipeline.

Reference to the accompanying map will show that two of the new lines are far removed from those parts of the country where most of the gasoline pipelines have heretofore been built.

One of these lines is in the deep southeast and extends from Port St. Joe, on the Florida Gulf Coast, just east of Panama City, approximately 350 miles to Atlanta, Ga. It is being built by the new Southeastern Pipeline Co., which has headquarters at Atlanta. The Gulf Oil Corp. and the Pure Oil Co., both extensive distributors in the southeast are said to be interested in the line which was first announced early in November, and there is said to be a possibility that other oil companies may become stockholders.

This pipeline will be eight-inch most of the way. It will bring gasoline into a territory which has heretofore been served almost entirely by transport trucking from water terminals. Some of this gasoline has been trucked as much as 500 miles from water terminals along the Florida gulf and Atlantic seaboard and some has been trucked from terminals at Birminghamport, at the head of navigation on the Black Warrior river, about 150 miles west of Atlanta. It was only a few years ago that improvements on the Tombigbee and Black Warrior rivers made it possible for the oil companies to barge their gasoline into this part of the southeast at a saving over former transportation methods.



Sometimes erosion of the soil leaves a section of gasoline pipeline exposed. Then a deep ditch is dug beneath the pipe for a distance and the pipe carefully lowered into that ditch. This picture shows one such cut made to get the pipe from an eroded hillside

Gasoline Transported By Pipe Lines in U. S.

Deliveries by refineries to the gasoline pipe lines, as reported by U. S. Bureau of Mines.

Year	Barrels
1938	85,297,000
1937	73,233,000
1936	58,436,000
1935	50,198,000
1934	45,383,000
1933	38,196,000
1932	29,573,000
1931	12,766,000

Barging and trucking of gasoline and other products has been developed extensively in this section of the country because of the high level of rail rates from southwestern refining districts.

Through this new pipeline will move gasoline, and possibly other refined products, brought from the oil companies' refineries on the Texas Gulf Coast by tanker and barge via the sheltered Intracoastal Canal. While announced plans call for the line being carried only to Atlanta, there has been talk of the line later being extended possibly into the Carolinas, with laterals on both sides extending to market centers. Savings in transportation costs seen through the building of this new gasoline line include the elimination of the long distance truck hauls and the saving of the long haul by water around the tip of Florida to terminals on the Atlantic seaboard, from where it has been trucked inland.

The other pipeline to be built in a section of the country comparatively new to this method of gasoline transportation is in the southwest. It will be used by Magnolia Petroleum Co. to move refined products inland from a terminal being constructed at Corpus Christi, Texas, to San Antonio, from which point truck transportation will be used to other consuming areas in the southwest.

Some observers see in this new line, which will be about 150 miles in length considerably more than appears on the surface. Magnolia already has a gasoline line in operation from its Luling, Texas, refinery to San Antonio. The company has a good crude supply in the southwestern part of the state and it is considered entirely possible, therefore, that the company may see the necessity, sometime in the future, for increasing the capacity of the Luling plant to take care of that crude. In that event it would be a simple matter to reverse the flow in the new pipeline, to permit transportation of products from the enlarged refinery to the

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terminal at Corpus Christi for further movement to markets by water.

The gasoline pipeline developments of 1939 also saw the Standard Oil Co. of Indiana, the pioneer and still the principal marketing company in the middle west, make its first venture in building a gasoline line.

It was announced early in the summer that this company would build a line from its refinery at Sugar Creek, Mo., near Kansas City, to Omaha, Nebr., and this line, 180 miles long, was placed in operation early in November.

An interesting feature of this gasoline line is that it parallels a navigable river, the Missouri, which one oil company at least used this summer to barge gasoline to a water terminal at Omaha, from Kansas City, although it experienced difficulties due to abnormally low river stages.

This gasoline line of the Standard of Indiana is in competition with two existing gasoline lines in the same territory. One of these is that of the Great Lakes Pipeline Co., extending from the Mid-Continent to Minneapolis, with laterals to Omaha and Chicago; the other is the Cimarron Valley line, of the Champlin Refining Co., of Enid, Okla., which now extends from Enid to Superior, Nebr., but which is being extended to Rock Rapids, Ia., and will pass within a short distance of Omaha.

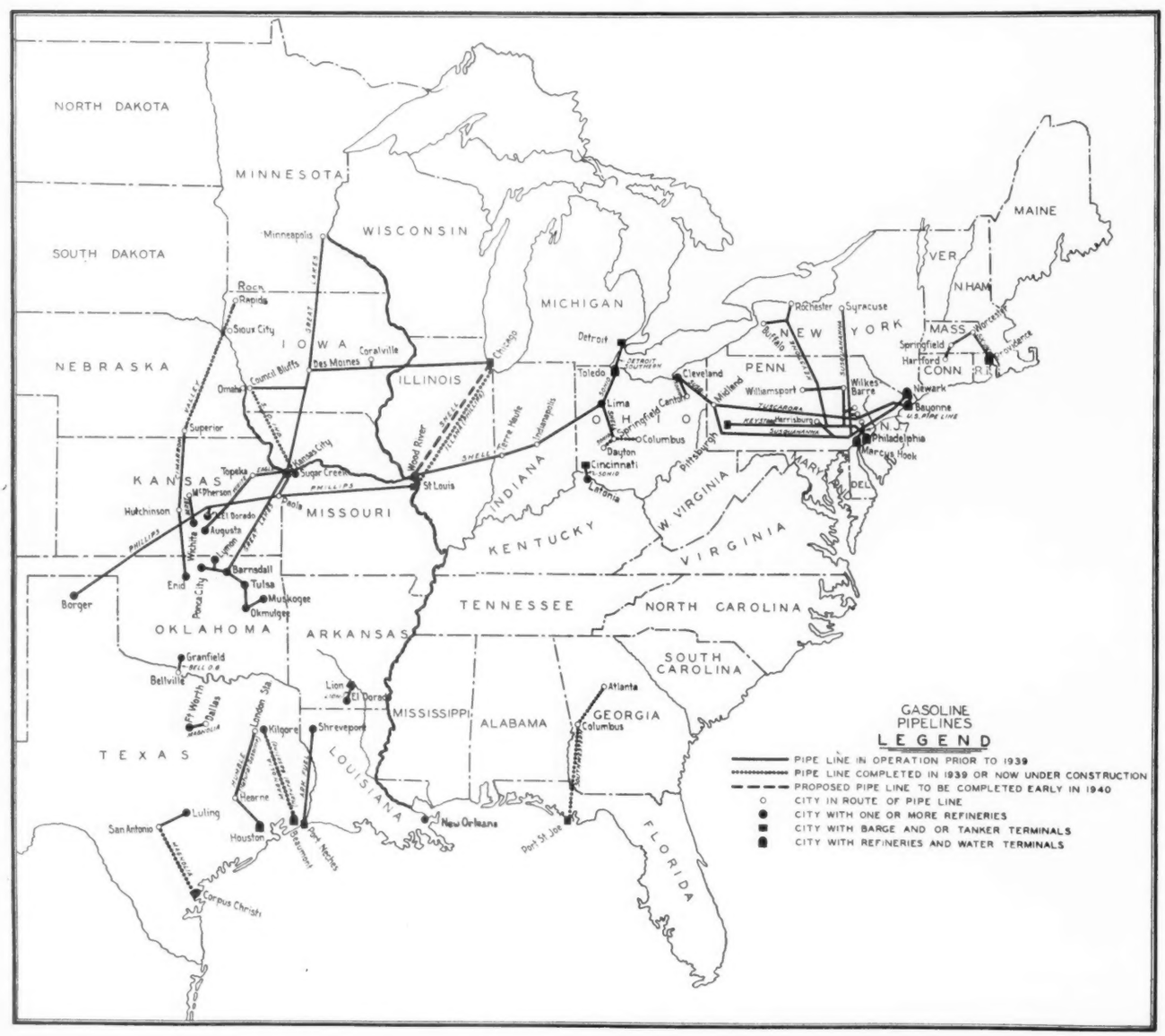
The other new gasoline lines, listed on an accompanying table, with one exception, are within or immediately adjacent to middlewestern and eastern consuming areas, which already have been tapped to some extent by gasoline pipelines and where this method of transportation already has been proved economically feasible.

The one exception is the Magnolia line from the East Texas field to its Beaumont, Tex., refinery. This line will carry butane and natural gasoline from East Texas natural gasoline plants to the refinery for the manufacture of high octane motor fuels.

The Humble Oil & Refining Co. has had a similar line in operation from the same area to its Houston refinery for two years or more.

The Illana Pipeline Co., (Phillips Petroleum Co.) connects with the Phillips Pipeline Co.'s eastern terminal at East St. Louis, Ill., and will carry refined products to Chicago. It, too, will reach areas which already are being served by the Great Lakes and Shell Oil Co. gasoline lines.

The Shell Oil Co. announced several months ago it was concentrating its middle western refining operations at Wood River, Ill., and that it would close its refinery in Chicago in 1940. It also was announced at the same time the company would convert its present



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The Christmas buying rush is here. Order your stock of Champion gift sets now, so your customers will not be disappointed when they come in to buy—and so you will get the extra Christmas profits which this unusual selling program gives you.

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crude line from Wood River to Chicago into a gasoline line. This line very nearly parallels the Illana line to the same destination.

The extension of its gasoline pipeline by Standard Oil Co. of Ohio will be from Springfield to Dayton, about 22 miles, and give this company one additional pipeline terminal shipping point in the state. Shell Oil Co.'s extension is from Springfield to Columbus, about 60 miles. In New England, Socony-Vacuum Oil Corp. is extending its line from Springfield, Mass., to Hartford, Conn., an important marketing center.

These relatively short extensions of their gasoline lines by these three companies give them access to new marketing centers by underground movement and eliminate trucking through congested areas.

All the conventional forms of transportation—trucks, rails and water—are used to move refined products from the pipeline terminals to consuming markets.

Some of the companies operating pipelines rely on both trucks and tank cars to haul from their terminals to their own marketing outlets and to those of their wholesale and retail distributors. Some companies permit their distributors to load their own transport trucks at the terminals.

Where the pipelines reach or cross inland waterways it is the general practice to use barges for some of the movement from terminals there. Some of the companies use their own or leased barges and will load barges operated by their customers.

The Great Lakes Pipe Line Co., probably is the only line which still depends entirely on rail haul from terminals to distributors. This line is owned by eight Mid-Continent refining companies and extends over 2000 miles from member companies' refineries to Kansas City, Des Moines, Omaha, Minneapolis and Chicago.

The eight refining companies owning the Great Lakes line at present and their proportion of stock holdings, as presented at a recent rate hearing before the Interstate Commerce Commission in Chicago, are as follows:

	Per Cent
Continental Oil Co.	31.2
Mid-Continent Petroleum	18.96
Skelly Oil Co.	14.22
Pure Oil Co.	9.48
Phillips Petroleum Co.	4.99
The Texas Corp.	12.44
Sinclair Refining Co.	5.88
Cities Service Oil Co.	5.15

These various methods of moving the gasoline and other products from pipeline terminals to destination has brought about several price bases.

Some companies sell on an f.o.b. terminal basis. This price usually is the company's f.o.b. refinery price plus a freight rate to the terminal. The distributor can do his own trucking from the pipeline terminal to destination or he can ship by rail and take advantage of the short haul rail rate.

Members of the Great Lakes group sell on the basis of Group 3 freight rate to destination. The distributor accordingly is invoiced at the delivered price, which is the refinery price plus the Group 3 rail rate to destination. The Great Lakes company pays the short haul freight rate from nearest pipeline terminal to destination.

Under the existing rail rate structure there are large savings for companies which utilize their own or affiliated pipelines for transportation of their own products. An idea of what that savings amounts to was given in a discussion of petroleum transportation by Fayette B. Dow, of Washington, general counsel of the National Petroleum Association, before the Temporary National Economics Committee recently in Washington.

Mr. Dow quoted comparative figures which listed refined oils transportation cost by rail at approximately 8.3 mills per ton-mile, as compared with only 3.2 mills by pipeline.

The gasoline pipelines, however, are not without competition for the business of moving this refined product from refineries into marketing territories. For example, the Great Lakes Pipe Line Co., which in 1937 handled about 18,500,000 barrels of refined oils, is reported to be now running about 26 per cent less gasoline than it did in 1938 and it is expecting a further decline in its business in 1940.

Harry Moreland of Kansas City, general manager of the pipeline company, testified at a recent Interstate Commerce Commission hearing in Chicago that this tonnage loss was due to the competition of other methods of transportation. He mentioned the growing water movement of gasoline on the Mississippi River and its tributaries, increased transport trucking from Kansas refineries into Nebraska and the movement of gasoline made in the new Illinois oil fields northward, as contributing to the pipeline company's loss of business.

Mr. Moreland estimated costs for moving a barrel of gasoline through the Great Lakes line in 1940, due to the dropping tonnage, as follows, as

Packed with excelsior these separators on one of the largest of the gasoline pipeline systems strain out all scale or other products of internal corrosion that are cleaned from the lines by scrapers. The gasoline stream enters at the bottom and passes out at the top. A battery of these separators are located at each of the pump stations

New Gasoline Pipeline Projects

New Gasoline Pipelines Completed or Started in 1939 or Announced for Completion early in 1940.

Illana Pipeline Co., affiliate of Phillips Petroleum Co., connects with Phillips Pipeline Co. gasoline pipeline at East St. Louis and extends to Chicago. Line completed and placed in operation in 1939; 300 miles.

Standard Oil Co. (Indiana), from Sugar Creek, Mo., refinery to Council Bluffs, Ia. Line completed and placed in operation in 1939; 180 miles.

Cimarron Valley Pipeline Co., (Champlin Refining Co.), extension of present system from Superior, Nebr., to Rock Rapids, Ia., via Sioux City, Ia. Now under construction; 285 miles.

Magnolia Petroleum Co., from Corpus Christi, Texas, to San Antonio, Texas. Construction started late in 1939; 150 miles.

Magnolia Petroleum Co., from Kilgore, Texas, to Beaumont, Texas. Line completed in 1939 and now ready for operation. Will carry butane and other natural gasolines; 225 miles.

Shell Oil Co., Inc., extension from Springfield, O. to Columbus, O. Now in operation; 60 miles.

Standard Oil Co. of Ohio, extension from Shell line at Springfield, O., to Dayton, O. Construction started late in 1939; 22 miles.

Socony-Vacuum Oil Corp., extension from Springfield, Mass., to Hartford, Conn. Completed in 1939; 25 miles.

Southeastern Pipeline Corp., backed by Gulf Oil Corp., and Pure Oil Co. New line from Port St. Joe, Fla., to Atlanta, Ga. Construction to start before first of 1940, to be completed within six or seven months; 350 miles.

Shell Oil Co., Inc. Conversion of present crude line from Wood River, Ill. refinery to Chicago, into a refined products carrier. Completion of project expected early in 1940; 300 miles.

Total Mileage of New Lines Listed 1897.

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compared with actual cost figures for nine months of 1939:

To	1939 9 Months Cents a barrel	1940 Estimated
Kansas City	19	26
Des Moines	21	29
Coralville, Ia.	26	36
Omaha	29	39
Minneapolis	33	47
Chicago	41	65

Data on the cost of moving gasoline by pipeline was also given at the same Interstate Commerce Commission hearing, by C. R. Musgrave, of Phillips Petroleum Co., Bartlesville, Okla. His figures were on the cost of moving gasoline through the Phillips line from Borger, Texas, to various points and do not include interest on investments. His figures were:

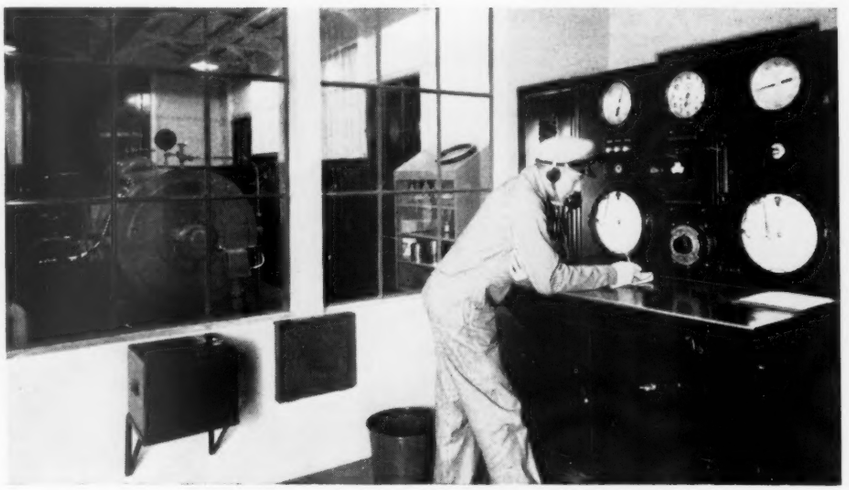
Borger To	First Six Months 1938 Cents a	1939 Barrel
Wichita, Kans.	24.05	28.12
Kansas City	23.41	22.76
Jeff Station, Mo.	25.40	20.55
East St. Louis	37.00	32.21

The steady increase in gasoline pipeline mileage since the first line was placed in operation in 1930 by the conversion and reversing of flow of a crude oil line in Pennsylvania, is direct evidence of the changes that are taking place in the industry in an effort to reduce costs, which have been passed on to the public in a lower price for its motor fuel.

This was pointed out very strikingly by Mr. Dow in his testimony before the TNEC. He said:

"The transportation economies were passed on to the consumers, not from philanthropic motives but because the economies themselves were the product of competition—a competition which forced the personnel of the industry to find cheaper and better ways of doing things and invariably to make use of those cheaper and better ways in gaining access to a share of the consumers' requirements."

The oil industry generally continues to refer to these underground carriers as "gasoline pipelines" but that designation rapidly is becoming a misnomer.



Every pipeline system has its own communication lines which permit constant contact between pump stations and the dispatcher. This pump station operator is giving his routine report and recording instrument readings to the dispatcher. Through the window can be seen one of the main line pumps

While a few of the lines still handle only the various grades of gasoline and natural gasoline, many others now could be called more aptly "refined light oils" carriers because of the variety of refined products moved through them.

So rapidly has the technique of light oils transportation by pipeline been developed in the past 10 years that it is no trick at all now for a line to carry eight or nine different products and a number of grades of each product, without contamination.

Several methods are employed to prevent contamination in the line. One common practice is to rotate shipments so that there is a decided difference in gravity between a certain product and the one immediately preceding and the one following it, in the line. This difference can be quickly noted by the line dispatchers. Another method is to use a dye to designate the end of one shipment and the beginning of another. The dye usually is placed in the last few barrels of the shipment.

Regardless of the methods used to prevent contamination, careful check is kept of the gravity of the products moving into or, through each gasoline pipeline pump station and into each terminal.

Dispatchers handle the movement of the products in much the same manner a train dispatcher handles the trains over his division.

Knowing the line's capacity and the rate of flow of the products handled, the dispatcher knows almost to the minute the location of each product moving through the line. He notifies a terminal or pump station operator just when to expect a change in products. The operator checks the gravity closely as the time draws near for the arrival of the new product at his station. It then is only a matter of a few seconds to switch the stream from one storage tank to another. Some of the lines have instruments which record constantly the gravity of the product passing through them.

Line walkers—who must travel a specified number of miles each day—patrol every foot of the lines, usually twice a week. They watch for small leaks and evidence of attempted line tapping. They keep weeds and grass and underbrush cleared from the exposed portions of the line and from around the poles carrying the communication wires.

Most of the leaks the line walkers find are small ones because any appreciable leak in the line is immediately indicated at the pump stations by a drop in the line pressure. There have been numerous attempts to tap the lines but in almost every instance the would-be thieves have been caught.

Some of the pipeline companies maintain their own special police force, however, and these officers work in cooperation with local peace officers in running down line tapping cases.

This dispatch board in the gasoline pipeline department of the Shell Oil Co., at St. Louis, is calibrated with the gasoline line. It is made so it can be lengthened or shortened to compensate for expansion and contraction of the line due to changes in temperatures. The long, narrow strip of paper records the movement of products. The dispatcher can tell by glancing at the paper just where each product is moving in the line at a given time

New Oil Shipping Points Make More Truck Hauling

FEEDING the growth of truck transport of oil products are the new marine terminals springing up along many rivers, streams and coastlines, 1900 additional miles of gasoline pipelines, with many new terminals, and the new oil fields which bring refineries closer to consuming centers.

Another factor is the extension of product exchange arrangements between oil companies made possible by these new shipping points. When several companies arrange to ship from the same refinery or terminal, it means more potential truck tonnage.

Yet the peak of the truck movement is still not in sight. Aside from increasing consumption, there is the further development of the truck's "feeders"—water transportation, for example. With 70 per cent of the U. S. population living within 50 miles of navigable waters, there is still plenty of expansion open to water transportation. Every new marine terminal fans out additional truck routes.

As pipelines, tank vessels and exchanges take away from the rails the long hauls, they create new short hauls to bulk plants. The truck's speed, low-cost operation, flexibility and other advantages weigh heavily in favor of it ultimately winning this newly-developed short haul business—even though the rails may be "given" the movement at the outset.

Leading truck authorities are convinced that the railroads cannot get their costs down to the level of the truck's for short hauls of petroleum products. Ultimately, competition among shippers will open up to trucks all of the short-haul movement from refineries and terminals—marine and pipeline, it is believed.

Indicative of the trend, is the progress that one company is making in shortening its hauls. In one of the states where this company operates, it now has 16 shipping points. No customer in that state is more than 75 miles from a shipping point and 85 per cent of them are within 35 miles' shipping distance. Rail shipments on these short hauls are the exception, with perhaps 80 per cent of the gallonage moving in the company's own transport trucks or those of for-hire transporters.

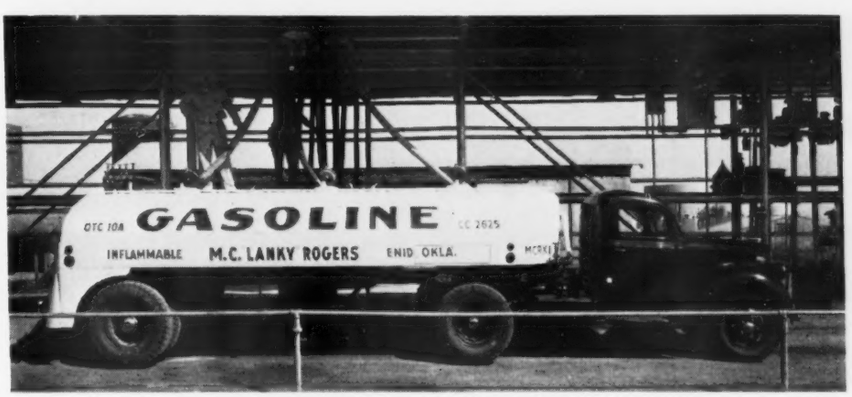
Long-distance trucking of petroleum products—as distinguished from bulk plant deliveries—began in sizable volume in the late 1920s. With improved truck equipment and better paved roads, the high freight rates of the railroads beckoned oil companies to lengthen their truck deliveries.

This veteran tractor-semi-trailer combination piled up 784,000 miles in 56 months, hauling 4,800,000 gallons of gasoline out of Charleston, S. C., to points in Florida, Georgia and South Carolina. Owned by Petroleum Carriers Corp., of Jacksonville, Fla., which has 60 pieces of equipment on the road, this unit operated seven days a week and in a record month traveled 17,630 miles. It was on display at the New York World's Fair (Photo by Ford Motor Co.)

Independent marketers using trucks to haul their supplies from refineries and terminals found that they were making a nice profit, since the petroleum price structure was based on rail freight rates. So, they began transporting for their brother marketers. Even at rates well below those of the rails, they had a comfortable margin over their trucking costs. Soon, some marketers were buying more trucks and devoting most of their time to the transportation end of their business. Many grew into large-scale transporters, hauling for their supplying companies over wide areas. For-hire truckers hauling other commodities became interested, bought tank truck equipment and entered the field. Thus petroleum transporting—an industry within an industry—was born.

The volume of petroleum products transported by truck has grown steadily in the last decade—and is still growing. For example:

For Indiana for three months, May, June and July, 1939, total receipts by rail were 148,526,958 gal-



Drivers for petroleum transporters help load and unload their shipments at refineries and terminals. Pictured here is a 3000-gallon tractor-semi-trailer combination which uses a high-tensile steel tank to save weight (Photo by Fruehauf Trailer Co.)

M. L. Wilcox
(Chairman)

J. B. O'Harra
(Vice-Chairman)

New officers of Petroleum Transporters Division are M. L. Wilcox, Downingtown, Pa., of Leaman Transportation Co., chairman, and Jack B. O'Harra, San Jose, Calif., of Pacific Truck Service, vice-chairman. Leaman has 100 pieces of tank equipment on the road, Pacific Truck, 50 pieces

lons and by truck, 70,174,192 gallons. In the same months of 1937, the totals were; rail, 165,525,942 gallons; truck, 47,396,558 gallons. This represents a *loss* from 1937 of 16,998,984 gallons for the rails as compared with a *gain* of 22,777,634 gallons for trucks.*

Transport truck hauls of more than 200 miles are common in most sections of the country, while longer hauls up to 500 miles are to be found in the southeast, middle west and Rocky Mountain sections. On the West Coast one of the longest hauls is that of Lang Transportation Co. from Los Angeles to Sholow, Ariz., a round-trip distance of 1164 miles, using a diesel-powered truck and trailer with light weight tanks having total of 6500 gallons capacity.

Meanwhile, the for-hire branch of petroleum transporting has grown into a substantial industry. Several for-hire transporters have 100 or more pieces of equipment on the road, representing investments of a quarter to a half million. During the oil hearing before the Temporary National Economic (Monopoly) Committee at Washington recently it was stated that 26 for-hire transporters, with an aggregate investment of $5,027,842, hauled 900,000,000 gallons in 1938.‡ It was pointed out that these 26 transporters handled about one-third as much volume as all of the gasoline pipelines, yet had a total investment of only one-twelfth of the pipelines' total investment.

For-hire transporters are of two types—the "common carrier," who holds himself out to haul at his published rates for any shipper, and the "contract carrier", who hauls under contracts for one or a dozen shippers and is many times open for another contract, making it difficult to draw the line between the two classes. (A third class, sometimes called an "orphan" because it is regarded as neither a private carrier nor for-hire carrier, will be discussed later.)

Generally, the transporter's rates are less than the rail rate, but there are instances where it is higher than the rail rate. In some sections, transporters' rates are based on a differential under the rail rate. In others it is based on truck costs without regard to the rail rate.

Transporters' equipment varies with the laws of the states in which they operate. Probably the most popular is the tractor and semi-trailer combination, with total capacities ranging up to slightly above 6000 gallons. Where permitted by state law, larger loads are possible with the use of a four-wheel or six-wheel trailer added to the tractor-semi-trailer combination or the addition of a full trailer to a straight truck, with capacities running up to 10,000-gallons combinations, which is the equivalent of a full-size railway tank car.

Annual mileages of more than 100,000 for individual trucking units are common — there was exhibited at the New York World's Fair a petroleum transporter's truck which had run up 784,000 miles in less than five years.

A study‡ of Interstate Commerce Commission records showed that as of Jan. 1, 1939, there were 911 separate individual or corporate motor carriers hauling for hire, which had on file with the Commission specific tariffs covering common or contract carriage of petroleum products over interstate routes. This total does not include for-hire trucking companies which listed petroleum products in their general tariffs, nor does it include, of course, local transporters who are not subject to the ICC's jurisdiction.

It should be pointed out that while any estimate of the total number of for-hire petroleum transporters would include a number of oil marketers who are also engaged in hauling for hire, besides their oil marketing business, such estimate would *not* include marketers using their own transports to haul for themselves but not for anyone else.

As to the total number of transporters, Morris L. Wilcox, Downingtown, Pa., vice president of Leaman Transportation Co., Inc., the newly-elected chairman of the Petroleum Transporters Division of the American Trucking Associations, Inc., estimates there are, all told, about 3500 for-hire petroleum transporters in the U. S. This takes in local as well as interstate haulers but not private carriers (such as oil marketers hauling for themselves). Mr. Wilcox pointed out that this 3500 total includes a great many small transporters—especially in the Middle West—who operate only one or two trucks. In one state (Nebraska), alone, he added, there are over 500 transporters. Several hundred more are said to be engaged in hauling from Kansas-Oklahoma refineries into Colorado, Iowa, Missouri and other neighboring states.

East of the Mississippi river, there are fewer petroleum transporters but they are generally larger operators. The Leaman companies, for example, have 100 pieces of equipment now on the road in Pennsylvania, New York, New Jersey, Delaware, Maryland, and adjacent parts of West Virginia and Ohio.

The Leaman companies concentrate

*Testimony of H. A. Hollopeter, Indianapolis traffic attorney, representing Indiana Independent Petroleum Ass'n. at Dallas hearings in Petroleum Rail Shippers' Ass'n. case, Oct. 23-26, 1939.

‡Oil transportation presentation before TNEC by Fayette B. Dow, Washington, D. C.

Petroleum Transporters Have Millions Invested in Their Trucking Equipment

WASHINGTON—Indicative of the size of some for-hire petroleum transporters are the following statistics on investment, equipment and operating revenues in 1938 for 15 of the larger transporters, taken from reports filed with the Interstate Commerce Commission:

Name	Value of Carrier Property (As of Dec. 31, 1938)	†Units of Equipment	Operating Revenues In 1938	*Tonnage Moved In 1938
The Lang Transportation Co., Los Angeles	$931,813	219	$1,506,813	**556,552
Leaman Transportation Co. Inc., Downingtion, Pa. (Del. Corp.)	279,639	74	478,019	421,512
Leaman Transportation Co., Inc., Downington, Pa. (Pa. Corp.)	96,648	24	173,403	149,478
Petroleum Transit Corp., Detroit	248,503	89	559,027	37,115
Pacific Tank Lines, Los Angeles	352,386	66	298,198	not given
Petroleum Carrier Corp., Jacksonville, Fla.	153,148	60	777,669	not given
Sprout and Davis, Inc., Whiting, Ind.	196,547	62	316,160	not given
Petroleum Transport Co., York, Pa.	130,557	22	348,126	145,154
Inland Petroleum Transportation Co., Seattle	90,997	15	217,139	***208,783
Arrow Transportation Co., Richmond Highlands, Wash.	323,621	50	561,000	122,605
Asbury Transportation Co. of Oregon, Inc., Los Angeles, Calif.	290,989	60	509,588	132,293
Asbury Truck Co., Los Angeles, Calif.	500,144	86	345,593	‡‡81,007
Capital Tank Lines, Bell, Calif.	85,973	18	114,689	not given
Petroleum Transportation Co., Seattle	187,750	36	287,056	109,816
City Oil Transportation, Haverhill, Mass.	122,534	25	132,982	not given
TOTALS	$3,991,249	906	$6,625,462	(Incomplete)

† Includes trucks, tractors, trailers and semi-trailers.
* Roughly, one ton equals about 300 gallons.
** Also carried about 50,000 tons, general freight.
*** Plus 8,356 tons of agricultural commodities.
‡‡ Plus 21,468 tons of oil well equipment and supplies.

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GMCs Actually Use LESS GAS

Size for size, General Motors Trucks give you *more pulling power* than any other comparable truck! That means real time-saving performance, less driving effort, in traffic and through hilly country. Yet the power advantages of GMC trucks are in addition. And the time-saving performance of GMC trucks is *in addition to* greater gas mileage. Owners report that GMCs actually use 15% to 40% less fuel. Try out a GMC alongside any other truck and see for yourself how much you can save, in hauling time and fuel costs alone, with these modern trucks!

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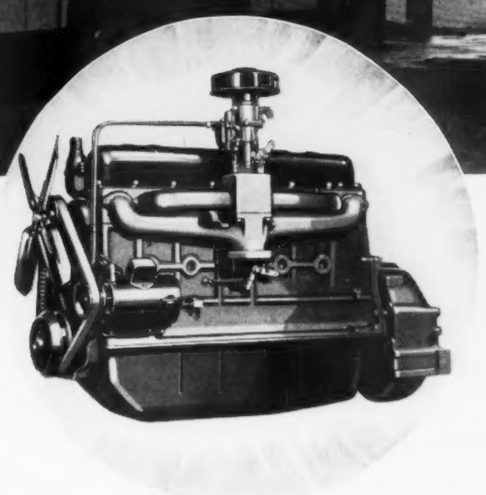

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GMC TRUCKS TRAILERS - DIESELS

on hauls within a hundred miles of the shipping points served, their average haul being 41 miles.

Each haul is carefully studied from all angles to determine how much it will cost, said Mr. Wilcox. "Then we quote a rate. If it's too high we just don't get the business—we wouldn't want it, if it meant going below our costs to get it," he explained.

Large transporters in the Middle Atlantic states, where the Leaman companies operate, have rates which are not much below rail rates—in some instances their rates are higher than rail and the transporters count on service rendered to hold the business, Mr. Wilcox said. This section of the country is criss-crossed with gasoline pipelines and waterways, not to mention ocean terminals and refineries. So, the hauls are short, the gallonage large. Shippers using the large transporters are mostly all major companies (as is the case in most other sections). There has been no general reduction in rail rates since truck transportation became a factor.

Mr. Wilcox named a dozen large transporters in his section, operating from 10 to 100 pieces of equipment each, adding that they were all making some return on their investment.

"What we fear is that some small transporter, who doesn't know his costs, will be singled out by the railroads as the 'competition' to be met and then a rate war will follow."

The proper field for trucks and rails is a debatable question, with water and pipeline transportation also competing for the long hauls, if not for some of the shorter ones also.

Although it is relatively quiet on the long-haul front, there is apprehension that the railroads are preparing to wage a "war to the death" for the short-haul movement.

The Petroleum Transporters Division of the American Trucking Associations is asking the ICC to make regional studies of the proper economic spheres of trucks and railroads, with due consideration given to the peculiarities of each region.

A suicidal rate war could be averted, it is believed, if the rails could be persuaded that the short-haul tonnage rightly belongs to the trucks because of their flexibility, speed and lower costs. Even reducing rail rates below costs, to a point where the trucks could not follow them down, would not win back all of their lost tonnage to the railroads, many oil traffic men say.

Another prominent transporter who finds his hauls are averaging less than 100 miles, is Charles Yokom, Detroit, of Petroleum Transit Corp., which operates 130 pieces of equipment in the section east of the Mississippi river, north of the Ohio river and west of the Pennsylvania line.

With the multiplication of shipping points, Mr. Yokom reports that his hauls are constantly growing shorter and now average between 50 and 75 miles. He believes the railroads will never succeed in driving the trucks off the road. "Public opinion will prevent that," he said, citing advantages in truck service which the rails cannot match. He, too, emphasized that superiority of service, rather than low rates, was responsible for the tonnage hauled by his company. Some of his rates are higher than rail, but mostly they are at the rail level or a shade under, he added.

As regards for-hire petroleum transporters, Mr. Yokom sums up his reasons for their existence, as follows: They are available to shippers who are unable to use their own equipment, for shipments in excess of their equipment's capacity and for shippers who do not wish to assume the liability of operation and the problems of managing motor transports.

The for-hire transporter, not engaged in the oil business, is a market stabilizer, according to Mr. Yokom. "Normal prices mean better freight rates," he pointed out, adding that the responsibilities of the for-hire transporter—both as to investment and compliance with various regulations—tends to develop a better operator "who realizes the necessity of maintaining prices and marketing margins," he said.

The 2B62 provides a full additional range of intermediate gear ratios, enabling trucks to make the best possible time on long, heavy hauls, over all types of roads, and up a variety of grades.

A heavy duty two-speed auxiliary, the 2B62 is recommended for use with big engines and big unit transmissions such as the FULLER 5A620. Telescoping mainshaft shortens the over-all length. Helical and herringbone gears. Ball and roller bearings.

Install the Model 2B62 Auxiliary Transmission in your trucks and haul more load faster!

How the 2B62 SPLITS THE RATIOS

To illustrate the additional range of intermediate ratios provided by the 2B62, below is shown the ratios available when this auxiliary is combined with the FULLER 5A-620 Five Speed Unit Transmission:

	5A620 Ratios	2B62 Ratios
5th (Overdrive)	.776	
4th (Direct)	1.00	1.33
3rd	1.72	2.29
2nd	3.50	4.65
1st	7.07	9.40
Reverse	7.11	9.45

Model 2B62 provides a reduction of 1.33. This unit may also be supplied with reductions of 1.58 or 2.00.

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Long Haul Rates Attacked By Refiners and Marketers

LONG-HAUL rail rates on petroleum products in all directions from the Mid-Continent refining district were subject in 1939 to more intensive attacks by shippers and carriers than for several years.

So vigorously were the campaigns carried on by interested parties that several traffic men now predict there will be a general reduction in long-haul rates within the next six or eight months.

Their predictions were based primarily on the following:

1. A few of the proposals for reductions in semi-localized areas have been granted.

2. The rails have shown an increasing tendency to fight side by side with the shippers for the proposed cuts.

3. A few of the rails have taken the initiative by announcing their intention of lowering rates without waiting for decisions on proposals now pending before freight associations and the Interstate Commerce Commission.

Principal causes of the assaults in 1939 on the rail rates were:

1. Increase of approximately 30 per cent in mileage of gasoline pipelines in 1939 and early 1940, which have taken business from the roads and threaten to take more next year.

2. Further expansion of water transportation of petroleum products, which is cutting in on a sizeable portion of the business the rails have had in the past.

3. More widespread use of transport trucks with a more pronounced trend in some sections to truck product direct from refinery to retail outlet, further depriving the rails of short hauls.

This loss of tonnage is shown clearly in the following table,* which compares volume of business handled by several railroads serving the southwest and middle west for the years 1930 (when gasoline pipelines were first started from the Mid-Continent) and 1938:

Carrier	No. Cars Refined Oils 1930	1938
Missouri Pacific....	66,851	35,761
Frisco	58,153	29,531
Santa Fe	130,742	61,222
Rock Island	58,800	31,326
Katy	59,354	29,147

Some of the rate reduction proposals were pigeon-holed. A few were successful. Others are still under consideration by the various rate regulatory bodies with decisions likely early in 1940.

One of the most far reaching proposals to be pigeon-holed was Southwestern Freight Bureau Docket 17221, which called for reductions of 0.5 to 0.75 cent a gallon on gasoline from the Mid-Continent area to mid-western territory.

Following failure to get this reduction approved by the SWFB, the Missouri Pacific and the Rock Island railroads announced they would reduce rates along their lines, from southwestern origin points, to mid-western destinations. These destinations include much of the Indiana Standard territory. Reduction would be approximately 0.6 cent a gallon on gasoline. Effective date of the proposed reductions has not been announced.

The southwestern lines also proposed a trainload rate from the Mid-Continent to Minneapolis and St. Paul, Minn. which was approximately 0.5 cent a gallon under present rates.

This was one of the first—if not the first—trainload rate proposal ever docketed, although the matter of moving products in trainload lots of 40 cars or more at a lower rate than the one prevailing for single car movement has been talked for several years.

The federal co-ordinator of transportation, in his "Freight Traffic Report," said:

"There is a relatively large field in which the potentialities of the rails as cargo carriers may be realized, if the carlot be separated from the cargo traffic and the latter handled in full train lots (and at train load rates).

"The data indicate that a full tonnage cargo train moving from a single origin track to a single destination track, without breaking the train line, would do so at a line cost of less than 2 mills per net ton mile, or below the average cost of pipeline transportation."

Trainload movement of petroleum products would not be new to the refining industry, since that method was used by the government during the first World War to expedite movement of oils to France.

The proposal of several roads to reduce rates 0.5 to 1.25 cent a gallon on gasoline from Mid-Continent refining district to Colorado points met with success and the new rates are to become effective Jan. 1.

The Missouri Pacific and Rock Island roads also have served notice that they are going to reduce rates along their lines from Mid-Continent refining points to Mississippi river crossings. This step follows an unsuccessful endeavor to get rate reductions from southwestern refineries to southeastern destinations. The southwestern roads were willing but the southeastern lines were not.

A PROPOSAL to reduce short-haul rates within the southeast was successful last June, however, with the cuts ranging from 0.03 to 0.42 cent per gallon on gasoline, depending on the mileage, from south Atlantic points to destinations inland in the southeast. This reduction is the fourth in that general area since August, 1932, to meet truck competition. Another short haul rate cut by the railroads was the 33 per cent slash Aug. 20 in Central Freight Assn. territory. Reduction was made to meet truck competition.

Finally, there is now pending before the Interstate Commerce Commission the complaint of the Petroleum Rail Shippers Assn. Vs. Alton & Southern railroad, in which the refiners in the Mid-Continent who must depend entirely on all-rail or truck are endeavoring to obtain a reduction in rail rates to middlewestern territory or a more uniform level of rates for all methods of petroleum transportation.

Refiners in the Mid-Continent and marketers who cannot avail themselves of gasoline pipeline or water transportation facilities have led the fights for rate reductions. Chief opposition has come from those refining and large marketing companies who are enjoying the more economical forms of transportation.

The railroads naturally have taken a hand in all the proceedings, in some

*From exhibit presented at Kansas Corporation Commission hearing in Docket 19240 (reduced intrastate rates).

TO ENGINE VARNISH

The industry faces a serious problem in engine varnish—that tacky substance which commits sabotage in modern motors. By clinging to the pistons, valves and cylinder walls, it causes serious trouble.

Conewango engineers have licked engine varnish with a new refining process called Selective Adsorption. This process, used *exclusively* for Conewango Process Motor Oil, removes varnish forming ingredients and improves lubricating qualities.

The pistons shown above were run at Pennsylvania State College under identical conditions; the first with a high grade, conventionally refined Pennsylvania oil, the second with Conewango Process Oil of the same S.A.E. grade. Note how Selective Adsorption virtually eliminates varnish formation!

This revolutionary development offers unusual profits to alert dealers and jobbers. Write now for complete information.

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cases being in favor of the proposed reductions and in other cases against lower rates.

If the prediction that there will be a general reduction in long-haul rates materializes, it will have a far reaching economic effect on the marketing and refining branches of the industry as well as on the business of the railroads affected by the rate cuts.

A clear picture of the probable effect of a rate reduction on the oil industry, particularly in the middle west, was given recently in the hearing before the Interstate Commerce Commission at Chicago in the Petroleum Rail Shippers Ass'n. vs. Alton & Southern railroad complaint.

More than 200 marketers, a majority of them well known independents, attended the hearing and many appeared as witnesses.

Their testimony took the trend that a reduction in rail rates, or a readjustment in rates for all kinds of petroleum transportation so one type would not have such a decided advantage over another, would bring back into the competitive picture many of the southwestern refiners who had lost a large portion of their former markets in the middle west because of the development of lower cost transportation by a number of their competitors.

THE testimony indicated that if a general rate reduction should be made, the entire middle west once more would become a highly competitive field for the entire refining industry within and adjacent to it.

It will be recalled that several years ago the Mid-Continent refiners shipped their products to all points in the middle west. They could reach beyond the Twin Cities in Minnesota, and even Detroit in the central section of the country. The development of pipeline and water transportation, coupled with truck movement from terminal in many areas, brought on the so-called "truck compelled" or lowered short haul rail rates. The Mid-Continent refiners who could not use pipelines or waterways gradually were placed at a disadvantage because of their high level of rail rates and they saw refiners who could use the short-haul or the pipeline and water transportation methods taking their business. These refiners gradually were pushed back into a constantly shrinking marketing territory until today those who are left have to depend almost entirely on the business in their back and front yards.

Trend of the testimony at the Chicago hearing also indicated that the marketers did not expect to obtain direct financial benefit from any rail reductions. Rather they believed that a reduction would bring all forms of transportation cost to a level where those who have been using the more economical methods which have developed in the past few years would not be able to save enough through low-cost transportation to subsidize other less profitable departments.

The larger companies operating their own pipelines and water transportation systems still would have some advantage even if rail rates should be reduced, since it is not conceivable that the rails would cut their rate to the levels of costs for water and pipeline handling of products.

Average Costs of Oil Transportation Given

Fayette Dow, general counsel for the National Petroleum Assn., Washington, testifying before the Temporary National Economics Committee, quoted the following as average cost for transporting oil by rail, pipeline and tank vessel:

	Mills per ton mile
Rail	8.3
Pipeline	3.2
Tank Vessel	1.25

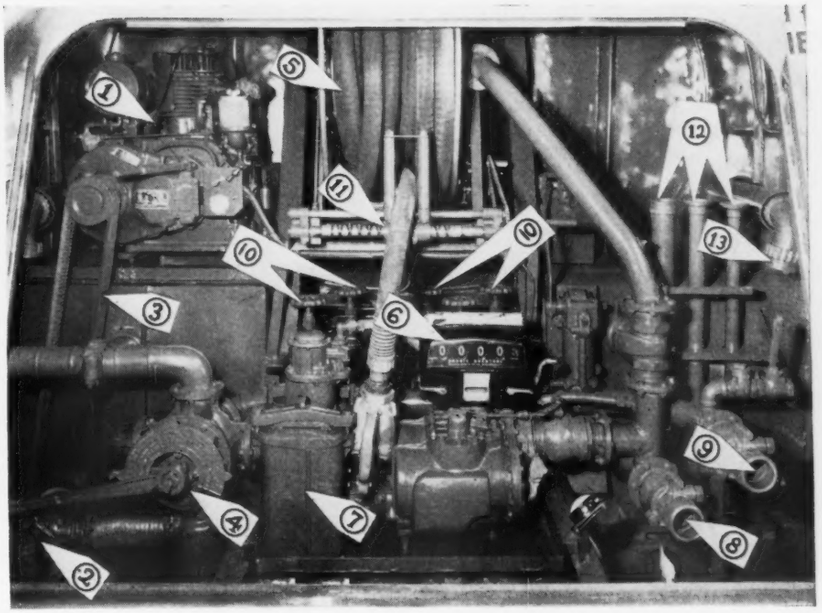
Reports of barge operators indicate that the cost for shallow draft vessels is in the neighborhood of 2 mills per ton mile. Thus, the trainload method as outlined above would be the only way, probably, that rail rates could be brought down to these levels.

It is interesting to note, meanwhile, that the petroleum rail shippers, in their complaint against the Alton & Southern, recognize that the rails have some economic advantages and that their rates therefore would not have to be down to the cost levels of water and pipeline transportation in order to hold their petroleum tonnage.

The oil industry's marketing business originally was geared to the use of tank cars for the handling of the products from refinery to bulk plant, the rail shippers have pointed out. Thus the rails would have that advantage of having been on the ground first and which having already established a set-up that would cause a certain amount of inconvenience in the event of a change to some other form of transportation. The rail shippers have pointed out that this advantage of the rails over pipelines, for example, is equivalent to approximately 0.5 cent a gallon.

Although water transportation is the cheapest form, the rail shippers say the rate advantage in favor of the rails over water would be approximately 1 cent a gallon.

This figure is arrived at by considering the additional cost for larger storage, the less flexible operation of getting oils from terminal to retail outlets, and the heavier investment in inventory required when water transportation is used.



Featuring either pump or gravity discharge, this assembly is used on a 3750-gallon, semi-trailer delivery unit for bulk distribution direct from pipeline terminals to service stations. A 6 to 7 H.P. gasoline engine drives a 90 g.p.m. rotary pump. A motor-driven hose reel with 75 feet of 1½-inch hose facilitates delivery to stations.—Photo by Standard Steel Works

1. 6 to 7 H.P. gas engine; **2.** 90 g.p.m. rotary pump; **3.** Belt drive—connecting gas engine and pump; **4.** Pump control valve; **5.** Hose reel; **6.** 2½-inch meter with quantity set and printing counter; **7.** Air eliminator and strainer; **8.** Pump-off discharge outlet; **9.** Gravity discharge outlet; **10.** Manifold valves; **11.** Level winder device on hose reel; **12.** Discharge nozzle; **13.** Hose in hose tube

New Lighter Steels Are Used In Trucks and Their Equipment

MANY factors, rather than any single outstanding development, are responsible for the greater utility to the oil marketing companies of the tank trucks of today.

Improved design, new materials, new construction methods and special auxiliary equipment all combine to make these units more efficient in operation, providing more capacity for payload in proportion to their total weight.

Tank and trailer manufacturers are using new improved types of weight saving steel, together with engineering refinements made possible by this steel, to make lighter, stronger units.

The steel makers have combined improvements in metallurgical technique with economies of mass production, to make high strength alloy steels which are easily worked and provide longer life in service.

The automotive manufacturers have provided the cab-over-engine design, streamlining, reinforced light weight frames and improvement in power output and various operating efficiencies. They also offer the oil companies a wide selection of models.

The makers of auxiliary tank truck equipment, through the use of lighter weight metals and refinements in design, have increased the efficiency of meters, pumps, manifolds, dome covers, multiple-speed axles and transmissions, power brakes and a variety of other items.

To make a satisfactory selection from the wide range of transport and local delivery tank trucks now available, oil marketers and transporters find it more important than ever to study the territory and conditions under which the equipment is to operate.

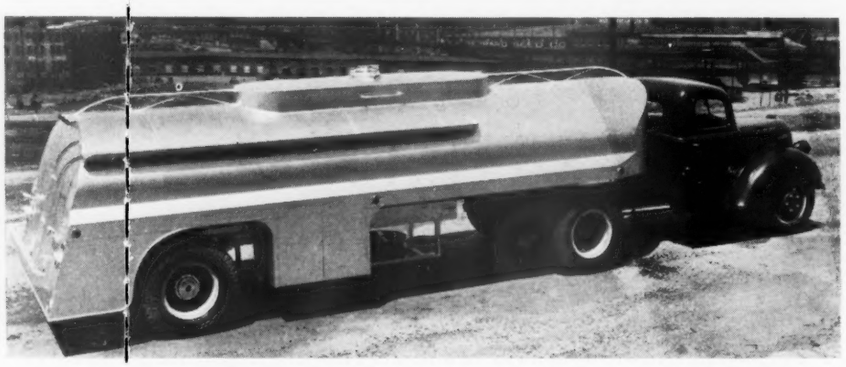
For example, it has been found that light-weight tractors will move 36,000 to 37,000 pounds—3500 to 4000 gallons—today in flat country without difficulty, but that they would prove inadequate for this load in mountainous areas. Experience has proved costly in attempts to use equipment not suitable for the particular job.

Tank capacities on transports are right up against the maximum allowed by law in states where the equipment is to operate. Units now being built by one manufacturer average 4000 to 4200 gallons capacity, with one to four compartments. A year ago the average was about 3500 gallons.

These units will have piping, manifolds, emergency valves and meters on an increasing number of them, but they will not have skirting, inclosed cabinets, or ultra-streamlining to detract from payload gallonage. These units now are pared down to their bare essentials, still without any great sacrifice to appearance, as operators concentrate on carrying all the gallons of products possible on a load. A few years ago some 500 pounds, equivalent to about 75 gallons of gasoline, would be hung on a transport truck in an effort to improve its appearance and advertising appeal.

Petroleum shippers using 3000, 3200 or 3500-gallon transports found they could meet the rail rate reductions which are being made by increasing payload capacity of these units by 100 to 500 gallons, without increasing their operating expense. One operator found he could replace a 4000-gallon tank with one of 300 gallons more capacity, at the same cost.

By redesign and the use of lighter materials, one company saved enough weight on accessory items such as tire carriers, bumpers, skirting, walk ways, ladders, and incidental equip-



Typical of ultra streamlining in modern tank truck design to obtain the maximum in appearance without sacrifice of payload. This 3750-gallon, one-compartment unit operates out of Jacksonville, Fla. The large expansion chamber on top has a volume of 4 per cent of the entire tank. Trellis work along the top is a ¾-inch tubing which connects dome with front and rear portions of tank, to eliminate air pockets caused by the truck being off level. Equipment includes two-speed axle, reinforced frame and power brakes on tractor.—Photo by Columbian Steel Tank Co.

ment to boost the payload capacity 55 gallons on a fleet of nine 3200-gallon transports. Safety was not sacrificed nor strength in the tank proper.

On an estimated three trips a day, 72 trips a month, or 864 trips a year for each unit, this peeling off of deadweight represents a total of 47,520 additional gallons moved by each truck during the year, or approximately 427,680 gallons for the fleet.

One manufacturer of tank trucks said a larger number of units were being purchased for making the haul direct from refineries or terminals to service stations. In general these are semi-trailer units of one to even seven compartments. The number of compartments on trucks is being reduced to an average of three or four and accurate measurement is provided for by a single larger capacity meter selectively manifolded to the discharge piping.

There is a revival of the trend to use high tensile steel tanks of 3000 to 4000 gallons, drawn by light automotive equipment. This is particularly apparent in the middle west section of the country, where the prevailing level highways put no excess burden on the tractor. The lighter units, aided by reinforced chassis, special axles and transmissions, and increased power, still weigh less than the larger units.

Going or gone, in many instances, are transports which are limited in speed when empty by gear ratios necessary under full load. Multiple speed axles and transmissions now get the truck back for a refill in a minimum of time.

One tank truck manufacturer has developed a new rear-spring arrangement for increasing speed and lessening vibration, at greater speeds, on an empty truck. This has a helper spring which carries the tank when empty, with a heavier unit which comes into play under load, thus providing easier riding at all speeds. This assembly has rubber bushed radius rods and the springs are of the slip-end type, eliminating all shackles and lubrication at these points.

Another manufacturer also reports a boost in transport capacities. He says the agerage tank now is well in excess of 3500 gallons and will approach 4500 gallons in some areas, compared to 2250 to 3000 gallons two years ago. He attributes the higher payload 50 per cent to smarter engineering and design and 50 per cent to wider use of high tensile alloy steels. These alloy steels now go into all transports and 90 per cent of the city delivery tank trucks made by this company.

On a 4000-gallon transport, built to Interstate Commerce Commission specifications as to gauges, it is estimated the weight saving is about 1800 pounds with high tensile steel, or about 275 gallons of gasoline. At the same time, tractor equipment has improved and will now haul 3500 gallons or more with the same sized equipment formerly used to transport tanks of 2500 to 3000 gallons.

For distribution in metropolitan areas, this company finds truck tanks are now generally in the bracket of 2000 to 3000 gallons on tandem axles, with high tensile steel used in all tanks. The average was 1200 to 2000 gallons two years ago.

Frameless tanks to eliminate weight of the conventional trailer frame continue to effect additions to truck carrying capacities. Design and construction of these units feature structural members built into the tank to make it self supporting, with the shell carrying the load. Payload increases of 125 to 150 gallons over the conventional type of trailer are claimed for this design by one manufacturer.

Improvements in this direction, which include several designs to eliminate the deadweight of tank bolsters, sills and other supporting members, represent a far cry from the old metal container strapped to a truck frame.

Much progress has been made, in the so-called frameless or integral tanks as well as the conventional units, in the utilization of reactionary forces within the tank proper to resist external stresses resulting from travel over the road. One tank manufacturer estimates tank life has been doubled and upkeep cost reduced by these improvements in structural design.

As evidence of the advanced thinking by tank makers today, is the realization that, if design is wrong internally, a destructive vibration will set up and eventually cause a rupture, and additional thickness of the shell will not prevent it.

One manufacturer points out that proposed ICC regulations provide for a gauge of shell metal predicated upon safety standards of design. That is, design, rather than thickness of metal, is the modern keynote of safety regulations, with standards in view for size of tank oval, shape of oval, number of internal bulkheads, supporting members and so on.

Using hot rolled steel, it is the practice of a mid-western tank manufacturer to use 12 gauge for the head and shell of less than 1200-gallon capacity tanks. For larger capacities, where compartments are subdivided 600 gallons or less, 12 gauge is used in the shell and 10 gauge in the heads and partitions. Where high tensile steel

Utility and streamlined appearance, without adding weight for this purpose, is secured in this truck of Dan A. Eck, independent oil marketer of Enid, Okla. The tank is 3000 gallons capacity, six compartments of 500 gallons each. A two-inch meter is installed in package carrier on curb side.—Photo by Butler Manufacturing Co.

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Miller provides you with the two most essential things for building and holding a profitable tire business.

First, an up-to-date, top quality tire in every price range — a complete line, with every tire carrying an attractive selling price and a liberal margin of profit.

Second, Protected Territory. The business you build is *yours*, without competition on your brand in your trading area. You create customers instead of merely making sales.

That is why so many successful distributors have been selling Millers for ten, fifteen, twenty years — showing a growth in sales and profits year after year.

COMPARE THIS MILLER 2 WAY FRANCHISE WITH ANY OTHER PROPOSITION

Here are Miller's "large company" features — Consistent High Quality year after year, Financial Responsibility, Consumer Acceptance, Research and Development Facilities, and ample Advertising Assistance.

Then add these recognized "small company" features — Protected Territory, Higher Margin of Profit, Individual Assistance on local problems, and Adaptability of program.

It's the winning combination — the kind of proposition *you would write for yourself*, a 2-Way Franchise.

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is used, a metal two to four gauges lighter is used.

A Pacific Coast company which recently increased its production of high tensile tanks, is using 14-gauge metal in the shell and long baffles and 12-gauge in the head and cross baffles, except the front head, which is 10-gauge.

While much credit is due the tank and trailer manufacturers for designs which eliminate large masses of deadweight metal, an important contributing factor in this success is the development of special steels, in which lighter gauges can be used.

Improvements in the manufacture of high tensile steels have been in the direction of greater ductility, higher yield point and ultimate strength, along with other changes which make the steel easier to weld and form, give it a finer finish and greater resistance to impact, fatigue, corrosion and abrasion.

To the tank manufacturers, the higher yield point offered by these steels, as compared with mild carbon steels, is an important factor, even more so than ultimate strength, because after the yield point is exceeded concentrated stresses develop which eventually break a metal down.

Compared to a hot rolled, blue annealed steel, which has a yield point of about 35,000 pounds per square inch and an ultimate strength of 40,000 pounds, high tensile steels offer yield points within the range of 55,000 to 60,000 pounds and an ultimate strength of 65,000 to 75,000 pounds.

Compared to ordinary mild steel, the high tensile product manufactured by one company is declared to offer 60 per cent more steel strength, three to five times greater resistance to corrosion, and to permit the use of 20 to 25 per cent less thickness, while still giving improved resistance to fatigue and impact.

As first offered, high tensile sheet steel was hard to work or mold and welding was difficult. Heat treatment at the mills made them more ductile and the amounts of alloy materials used were varied to improve weldability.

Twin-tank transport truck design discards the conventional oval shaped tank mounted on the flat side and uses two tanks, each of which is mounted on the narrow side of the oval. The twin tanks are both tied and piped together. Center fill openings are provided. High tensile steels are used to keep the weight down. Capacity is 4000 gallons. Pyramid Oil Co. is an independent marketer in Girard, Pa.—Photo by Butler Manufacturing Co.

This was the first step, but further improvement was necessary to eliminate the rough mat-like surface and make these steels dense so they would take a high gloss. Today's tank trucks require almost as high a gloss and finish as a modern automobile.

One steel manufacturer points out that, where high tensile metals are used to decrease the weight of a structure, designs based upon relative comparison of strength sometimes proved faulty because of failure to give proper consideration to deflection. This resulted in loss of rigidity and developed increased vibration in moving structures.

Where older types of construction relied upon mass and weight of low strength mild steels, to provide safe performance, at a sacrifice of payload, modern design has stressed increased rigidity in taking full advantage of the higher strength and light weight characteristics of the high tensile steels.

Today, practically every major steel company is manufacturing a high tensile steel, although the process used and the per cent and kind of alloy metal varies to a considerable degree. Analysis of these steels shows the use of such ingredients as: Carbon, Manganese, Copper, Chromium, Nickel, Silicon, Molybdenum, Zirconium, Sulphur and Phosphorus.

One manufacturer, in pointing to the "balanced" composition of its high strength steel, says the silicon confers strength and elasticity and, together with nickel, chromium and zirconium, strengthens each individual grain and its boundary to the same degree, resulting in uniform mechanical properties throughout the steel. Copper aids corrosion resistance.

Zirconium, which eliminates nitrogen and oxygen to produce a clean steel, adds another claim by this manufacturer for "non-aging". Because its properties do not vary with time, non-aging steels are declared more resistant to fatigue, impact and corrosion, especially at cold worked or strained areas.

Good welding properties in these steels are obtained by limiting phosphorus and sulphur content to .04 per cent, thereby avoiding embrittlement. Trouble has also been eliminated by this company through paint peeling off due to air-hardening around a welded spot.

The company points out that as regards the chemistry, or alloy content of the steel, the presence or absence of one or more elements may or may not be significant. Moreover, different elements have an important influence on the properties of a steel when associated with a third, it is stated.

That is, when a multiplicity of alloying ingredients are added to obtain different characteristics, care must be taken or a composition balance may be destroyed by too much or too little of any one component.

While it is not difficult to obtain a yield point and tensile strength by

Designed for bulk distributing operations in the middle west. This four-compartment, 4000-gallon, semi-trailer unit features high tensile steel tank construction and a 1½-ton cab-over-engine tractor. Rails the full length of the tank on both sides of the catwalk carry package goods.—Photo by Standard Steel Works

NATIONAL STEEL HIGH TENSILE ALLOY

DUCTILOY

ITS INHERENTLY FINER GRAIN MAKES ALL THE DIFFERENCE

a superior high tensile steel unusually well suited for use in Truck Tanks and Trailers

Fruehauf Trailer Co., world's largest truck-trailer manufacturer, uses DUCTILOY.

TRUCK tanks and trailers made of DUCTILOY can withstand the punishment they take in transit, both loaded and empty, because of the high resistance to fatigue and impact of this unusual high tensile steel.

High fatigue and impact resistance is charactertistic of DUCTILOY, at both normal and extremely low temperatures. This is particularly important in equipment that operates in all seasons, in all types of weather and temperature conditions.

DUCTILOY has other properties, of special importance to both users and manufacturers of truck tanks and trailers. It is unusually ductile, and can be cold formed readily, in most cases without any change in shop practice. It has a high yield point, high ultimate strength, excellent weldability, and marked resistance to both corrosion and abrasion.

Specify Ductiloy for your truck tanks and trailers. Specify Ductiloy for any application where a superior high tensile high-Ductile steel is needed. Great Lakes engineers will be glad to consult with you—to show you how others have used Ductiloy to their profit, and how to adapt this new steel to your special needs.

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DIVISION OF

NATIONAL STEEL CORPORATION

This 4000-gallon four-compartment semi-trailer unit is representative of construction and design being adopted to eliminate excess dead weight in side skirting, package carriers and so on. Tires are 10.50 x 20. The tank is high tensile steel. The tractor is a cab-over-engine type. The unit operates in Colorado and Wyoming.—Photo by Columbian Steel Tank Co.

addition of these elements in a variety of proportions, it is not easy to retain these important factors and still retain ductility, the sales manager for this company said. He added that it was even less simple to retain ductility and at the same time obtain good impact properties, especially at low temperatures.

Preservation of high yield point and tensile strength, together with no susceptibility to strain and quench aging, fair resistance to corrosion, high fatigue endurance limit and capacity to resist free vibration, ability to be processed and fabricated easily, is outlined as the goal of the makers of high tensile steel.

Transport trucking is said to impose the most fatiguing service for all steels. Consequently, in the use of high tensile steel along with modern design of tanks, it is particularly important that maximum resistance to fatigue and impact be an inherent quality of the steel at all temperatures and under all types of operating conditions.

Development by this steel maker has been in the direction of a high tensile product which not only compared favorable with other high tensile steels at ordinary operating temperatures, but also offered improvement in resistance to fatigue and impact at abnormally low temperatures. Some of these temperatures were at zero and lower but still within the range of truck operating conditions.

This discussion would not be complete without mention of new trends for increasing tank truck safety and in development of auxiliary tank truck equipment.

In connection with the former, more lights are being put on the modern truck and more effective lights. Reference to accompanying photographs will illustrate use of light clusters on the truck rear. Modern practice usually calls for a separate and larger stop light—7 or 8 inches in diameter—which in some states must be operated by an individual switch before the foot brakes are set.

As transport units increased in size and capacity, synchronizing truck and trailer brakes were adopted, so that operation of the foot brake actuates both sets and provides greater control of the unit. The trailer brakes come on slightly ahead of the tractor brakes. Booster mechanism on trailer brakes has also been increased in size to provide more effective braking action.

There is increased use of light gauge —14 to 16—steel tube turns and tubing in the modern tank truck piping system and also a trend toward the use of larger diameters in an effort to get away from short bends which cause turbulence and slow down flow of liquid through truck discharge systems. Most popular size piping today is 3-inch, which has meant the use of larger faucets, streamlined valves and meters.

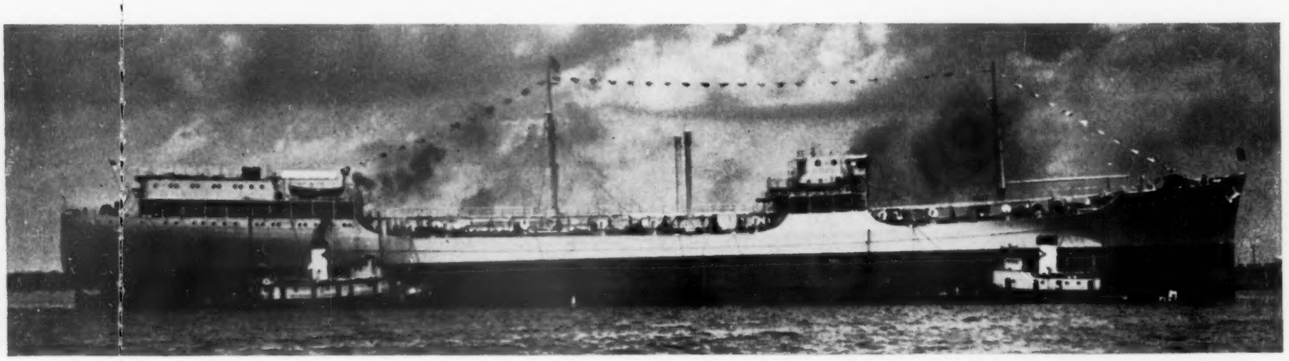
Favorable reception has also been given selective manifolding devices for multiple - compartment discharge through a single meter. While this has meant fewer meters per truck it has also meant more trucks equipped with meters. The device permits, with negligible contamination of products, individual discharge of each compartment and reduces the necessary piping by more than one half, thereby eliminating that much deadweight.

Although 2½-inch meters are the order of the day on most modern truck installations, meter manufacturers have used light-weight metals so that the weight is about the same as for a 2-inch unit, about 75 pounds. Compactness of strainer and air eliminator is also a feature of new design.

Every effort is being made now to see that valves, piping, and other fittings are of a size and design to permit discharge up to the maximum possible with the meter. Unloading speed is becoming an important factor in the operation of the larger and faster transport trucks on a 24-hour basis, where every minute counts. Use of 3-inch meters and suitable discharge lines and fittings is proving feasible on the larger transports.

Fill openings, to accommodate larger loading pipes now being used to reduce idle time at the loading rack, have been increased, with a 10-inch hole in common use. Emergency valves, tank truck manufacturers report, are now specified by most purchasers. These are all equipped with fusible links.

Tire sizes have been increased to accommodate the larger prevailing load, and special axles. Some 1½-ton units are using 9.75 x 20 tires with a carrying capacity of 15,600 pounds, compared to a capacity of 10,600 pounds with the regular 8.25 x 20 casing.



Outstanding 1939 development in tanker construction was the building of high-speed vessels, which would be privately owned but available for national defense, under agreement with U. S. Maritime Commission. Pictured here is one of the eight tankers so far launched—the S. S. PLATTE, 18-knots speed, 523 feet long, and over 6,000,000-gallon capacity. Built for Standard Oil Co. of N. J. by Bethlehem Shipbuilding Co., the U. S. Navy has exercised its option and purchased the vessel

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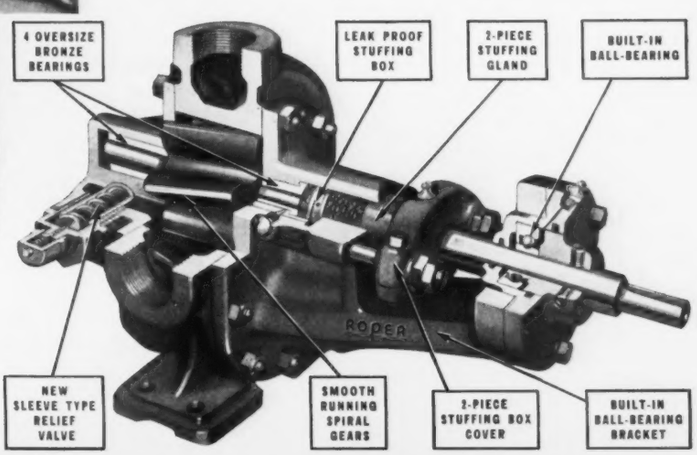


Write for

Bulletin N278

Geo. D. Roper Corp.
Rockford, Illinois

ROPER TRUCK PUMPS

Changing Over Bulk Plants To Receive Transport Deliveries

THE truck transport delivery of oil products from terminals and refineries has speeded up the modernization of oil marketers' bulk plants. The location of new plants has been shifted to the highways and existing plants in many cases have been altered to provide for the unloading of transport trucks and to speed up the movement of bulk products through the plants.

For conversion of existing bulk plants to receive transport loads, the simplest change-over has been the laying of a new pipeline, tapping the suction line at the pump, to a location for the transport to unload as near as possible to the pump house without blocking delivery truck drives. Where the pump house location and drives permit a short unloading pipeline, this change-over can be made for as little as $10 covering materials and labor.

As the economies of truck transportation consist in keeping the units rolling, additional changes in bulk plants are indicated for speedier unloading, to reduce the transport's idle time. Where distances are relatively short between the terminal or refinery and the bulk plant, as in part of the middle west and the east, the amount of time required for unloading becomes more important than where long hauls of possibly hundreds of miles are involved.

With unloading time an important factor on the shorter hauls, pumps handling up to 350 to 500 gallons a minute are being installed at the larger plants. Discharge and suction lines are being increased up to four, five, and possibly six-inch lines.

In anticipating future changes in unloading equipment at bulk plants, one marketing company, that began truck transportation last summer, put in larger discharge lines when new tankage was installed at bulk plants. All the new discharge lines are 2½-inch piping, although some pump ports were only 2 inches, against the time when larger capacity pumps will be installed.

The flexibility of transport movement releases the bulk plant from a railroad location. This trend was evident from the early days of transport movement from refineries into Nebraska. Marketers combined a service station and bulk plant in one operation through buying additional storage or erecting tankage back of the service station. Highway locations also are being used in Kentucky and Tennessee for transport deliveries out of marine terminals.

While the simplest change-over is to construct a transport unloading line at existing plants, some marketers are now studying their distribution in terms of possibly combining several plants, or building a new plant and consolidating outlying plants into a new center of distribution.

The economies of truck transport are not entirely secured through the reduction in actual transportation costs. Bulk plant investment expense can be reduced, where new plants are installed, because less storage is necessary for truck bulk plants than for railroad bulk plants. Less capital has to be tied up in inventories of oil products handled in bulk also and the time of the agent spent in unloading shipments is reduced.

The time required to unload a transport is less than for a tank car, for the same quantity and with the same bulk plant handling equipment, and the time saved by the agent or employe in the routine duty of receiving shipments can be spent in additional sales work. The transport can move to the unloading spot, connect the hose and open valves faster than a tank car can be connected and made ready to pump off. The transport is unloaded from underneath, so the pump works on a positive head and does not have to pull on a long suction line as in the unloading of tank cars overhead.

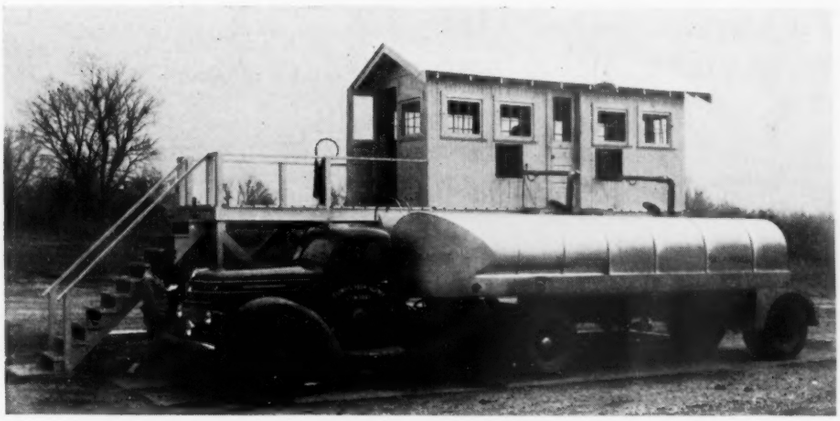
The savings in unloading time is estimated by one marketer to average about 20 per cent. An 8000-gallon tank car required about 2½ hours and two 4000-gallon transports can be unloaded in a maximum of 2 hours, and at some bulk plants as quickly as 1 hour and 20 minutes, this marketer stated.

A smaller amount of capital is required to handle business with transport deliveries. There is less outlay if money for the load and transportation, and with quick deliveries a smaller inventory is required, so one transport load, can almost be turned before the next one arrives. In fact, the origin of trucking in Nebraska out of Kansas is credited to a marketer seeking a way to reduce the capital necessary to carry on his business as well as seeking quicker deliveries by transporting directly north out of Kansas rather than by tank car movement through Kansas City to Omaha and then westward in Nebraska.

Another economy for the bulk plant receiving transport deliveries is a reduction in shortages. Temperature corrections are made when the transport is loaded, and during the relatively short hauls there is little opportunity for a change, so products are received at the bulk plant at approximately the same temperature at which the transport was loaded, and the volume has not changed.

A small inventory at the bulk plant

Marshall-Putnam Oil Co. bulk plant in McNabb, Ill., which was changed over to receive gasoline inshipments by transport from the water terminal at Kingston Mines, merely through laying a pipeline to the side of the pump house



A 4000-gallon transport of the Illinois Farm Supply Co. loading at the Kingston Mines water terminal dock to deliver to county service bureau bulk plants in the Peoria area. Gasoline is loaded through two printer type meters. A transport loads and wheels onto the highway in about 12 minutes

is possible, reducing the capital tied up in products, because additional merchandise can be received promptly by transport. Theoretically the inventory could be negligible, just enough from load to load, but as a protection against possible delays a larger inventory is actually carried. One marketer found that transport delivery permits a 50 per cent reduction in stocks carried in storage. This company formerly carried a two weeks' supply in bulk plant tanks. With transport delivery the inventory now is only a one-week supply. This inventory is carried in bulk plants converted to transport inshipments, and the storage released from gasoline inventory can be used for other products when the tank car market is favorable to buying for storage. The company recently was able to take on several additional tank cars of lubricating oil as storage formerly used for gasoline was available.

The flexibility of truck transportation, along with the fact that business is conducted on a smaller inventory, but with a faster turnover, has led to the construction of low cost, small capacity bulk plants along highways the transports use. Marketers in Kentucky and Tennessee have constructed such plants, with supplies only a few hours away by transport from water terminals. These plants generally are near a dealer's station and the dealer for a modest sum watches the plant while the agent is out on his delivery truck.

One marketer has built four of these highway bulk plants, costing about $2000 apiece for 8000 gallons storage, a sheet metal warehouse-garage with 480 square feet of space, and two pumps. The marketer is putting from 45,000 to 50,000 gallons a month through plants, while a railroad bulk plant to handle such a volume would cost more and require considerably more storage. Another marketer also has built four transport bulk plants, each with 12,000 gallons storage capacity, a 400-square foot warehouse. Some of the plants have gravity unloading of transports and loading of delivery trucks. These plants handle from 15,000 to 30,000 gallons a month. The investment is less than $2000, while, if the plants had been built on a railroad, they would have cost around $5000 and minimum storage capacity would have to be 50,000 to 60,000 gallons.

New bulk plants, however, are not necessary for receiving products by truck transport. In Illinois, where truck transports have lately come onto the marketing scene, existing plants along the railroads have been converted at a nominal cost to take transport shipments. Peoria, for example, has become a water terminal point, with the opening last spring of one terminal in the city and another at Kingston Mines, 17 miles south of Peoria on the Illinois river. Transports move products into the surrounding countryside to bulk plants within a radius of some 60 miles. Some of these bulk plants were altered to receive transport shipments by merely the construction of a new pipeline. Tank car unloading lines were not disturbed, as kerosine, tractor fuels and burner oils are still received at these plants by railroad shipments.

The Sweney Gasoline & Oil Co. converted its bulk plants in the Peoria district to receive truck transport deliveries of four grades of gasoline, a white stove gasoline, colored third grade, regular and Ethyl grades. Deliveries are made in 4000-gallon transports or in a 7000-gallon train from the water terminal in Peoria.

Before the bulk plants were converted to transport inshipments the company's superintendent of construction and an executive conferred on what changes were necessary. The superintendent of construction and a representative of the transport line then visited each bulk plant and made actual plans of the alterations. Only one preliminary plan was changed; a pipeline was extended to the curb at one plant so the transport could stand on a side street and unload. The average cost of making the conversions was around $5 for materials and $5 for labor.

The materials required were a T for tapping the suction line, a gate valve, and the pipe and fittings. In one plant the pipeline had to cross the doorway to the warehouse driveway, to reach a spot most favorable for parking the transport. The permanent pipeline was laid to each side of the driveway door, and a temporary line extended across the doorway. When a transport comes to this plant the temporary connection is made, as the pipe across the doorway has a union at each end. After the transport is unloaded the unions are unscrewed and the temporary section removed.

Each bulk plant had to have a pipeline tailored to the plant's requirements on account of the various locations of pump house and driveway. At the Pontiac plant the line is only about 10 feet long. The warehouse, where the pumps are located, has the floor several feet off the ground, and a drive on each side. One drive is used for the delivery trucks. The other drive is used by the transport. The suction line was cut near the pump and a T installed. After a short section of two-inch line there is a gate valve and the line goes through the floor, makes a 90-degree turn and then runs horizontal to the ground, to the transport unloading spot, where there is a reducer with the line ending in a foot section of three-inch pipe.

The bulk plant at El Paso has a 20-foot section outside so the transport can park on the side street. The suction line was tapped with a T. Then there is a 45-degree elbow to carry the line above several other suction lines from the tank car unloading rack. Outside, the two-inch line goes through a 90-degree elbow, followed by a 20-foot length of pipe to the street. The capped end is about 10 feet from the street, so the length of hose on the transport will not kink.

The transports serving the Sweney plants are sealed after loading at the water terminal. At the bulk plant the agent inspects the seals before they are broken. The transport driver connects the hose, and the bulk agent pumps off the load.

The other water terminal in the Peoria district, at Kingston Mines, is operated by the Illinois Farm Supply Co., serving the local service bureaus in the Peoria district. All these plants were converted before the terminal was placed in operation last summer.

A field representative of the Farm Supply company visited each bulk plant, making a diagram of the ground plan, and writing specifications for the new pipeline and any additional driveways needed so transports would not block delivery trucks at the loading rack. The actual change-over work was done by the local service company.

The county service company bulk plants were not changed on the discharge side of the pump on account of the transport delivery method.

Use HORTONSPHEROIDS for
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MARKETING organizations have found that the storing of high test fuel in tanks which will stand a pressure of several pounds per square inch stops evaporationlosses due to breathing, prevents lowering of volatility, and guards against reduction of specific gravity and octane rating.

An example of how modern oil companies utilize Hortonspheroids is being demonstrated at the ocean terminal which the Standard Oil Company of New Jersey operates at Wilmington, N. C. At this terminal, motor fuels are handled and stored in Hortonspheroids, eliminating deterioration in quality by preventing breathing evaporation losses.

The large illustration above shows two 2,520,000-gal. Hortonspheroids at the Wilmington terminal. There is also a third spheroid, not shown, of 625,000-gals. capacity. All three spheroids are designed to withstand an internal pressure of 2½ lbs. per sq. in. The chart reproduced above shows the actual pressures for one week in one of the larger spheroids. The figures outside the zero line indicate pressure, 10 divisions equalling 1 lb. per sq. in. On the readings inside the zero line, 10 divisions equal 1 in. of mercury vacuum. As may be seen, the pressure dropped to, or slightly below, zero on only two nights during that week, and touched 2½ lbs. pressure twice.

Our nearest office will be glad to give you complete information about Hortonspheroids. Units for handling motor fuel are available in standard capacities ranging up to 100,000-bbl., or more, and for pressures up to 15 lbs. per sq. in. Where higher pressure is desired, as in handling natural gasoline, standard sizes range from 2,500 to 30,000-bbls.

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However, at some 25 plants additional storage was needed for more lines of products. Where new tankage was installed a 2½-inch discharge line was laid, even if the pump ports were only 2-inch, to be prepared when larger pumping capacity is provided some time in the future.

In converting the plants the basic plan was to use the present pumping equipment, making it as efficient as possible through having the suction line short and eliminating unnecessary turns. All the transport suction lines are 2½ or 3-inch pipe. The transports carry adapters so the hose can be attached to either size line.

Conversion of the plants to receive transport deliveries has brought on several other changes there, for the transports roll 24 hours a day and night deliveries are received. Pump houses are to be equipped with vapor-proof lights, and a night flood light is to be installed in the yard so the driver and agent will not have to work around with a flashlight. Another change is in the identification of valves for the guidance of the driver unloading the transport. All valves are to be equipped with a metal tag, stamped with the number of the valve. Charts will be posted on the pump house wall showing the capacity of each storage tank, and the number of the various valves to be opened in order to unload into each tank. Gauges also will be installed on storage tanks so the driver unloading alone will not have to climb to the top of tanks for readings.

The dock man at the terminal in Kingston Mines meters the two grades of gasoline to the transports, and seals the compartments and the unloading valves. Thermometers are in the two loading lines and the temperature correction is made on the delivery ticket. At the bulk plant the agent inspects the seals, and gauges the storage tanks before and after unloading the transport, recording the readings on the delivery ticket.

The company keeps on file signed delivery tickets for all transport loads. If the load is handled during the day the bulk plant agent signs the ticket which is returned to the terminal by the driver. If the unloading is done at night when the bulk agent is not around, the driver returns the delivery ticket to the terminal, rather than leaving it around the plant where it might be mislaid. Then the terminal office mails the copy to the bulk plant with a return postcard to be signed by the agent, which is his certification that the load was received.

About 90 per cent of the loads rolling out of the terminal are on a keep-fill system. Each night the bulk plant agents in the terminal's territory take inventory and mail the report to the terminal. The following morning the terminal has the inventory records, and plants requiring immediate deliveries are put on the schedule for that day, while those with a larger stock are scheduled for loads a day or so later.

Three-Step Program Cut Bulk Hauling and Delivery Costs

1—Oil Company Modernized its Own Truck Fleet and Dropped Using For-Hire Carriers.

2—Routing and Dispatching was Studied and Standards for Performance Set Up For Drivers.

3—Regular Inspections for Vehicles Adopted and Routine for Repair Work was Set Up.

TO WHAT extent is it profitable for an oil company to utilize its own equipment in the bulk transportation and wholesale distribution of petroleum products?

If a preliminary survey indicates improved economy, flexibility and efficiency with a company-operated fleet of distributing tank trucks and transport units, what other factors must be considered in determining how far this program should be carried out to assure maximum advantages?

In answering these and other questions, Wilshire Oil Co., Inc., one of the leading integrated independent oil companies in California, has revamped its entire transportation system over the past two years. Rising rail and contract trucking rates indicated lower costs under company operation. Today, except for periods of peak demand, when some "for-hire" equipment is called in, this company moves in its own equipment, a volume of products that has trebled during the past four years.

Savings in operating costs were accomplished by means of larger capacity distributing equipment and by improvements in operating technique.

Prior to 1938 Wilshire did none of its own bulk transporting between main supply points and substations. In June, 1937, the expenditure for hired bulk hauling was as much as the cost of its own transports in September, 1939; but 88 per cent more gallons were handled in this September.

Important to an understanding of accomplishments by this company in developing a transportation suitable to its particular operation, is some knowledge of factors which dictated a change in method of operation. These included:

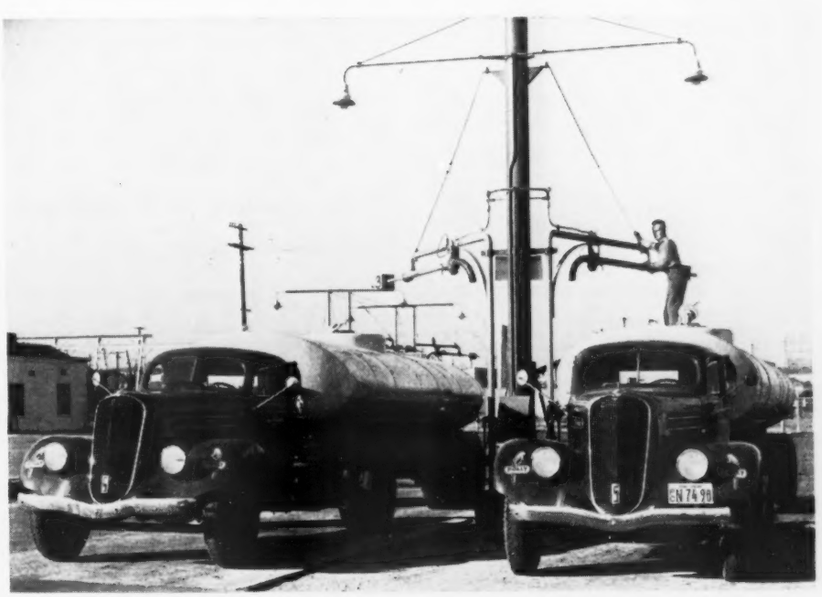
1. An increase in volume of products handled. From a total of approximately 3,000,000 gallons of gasoline handled a month in the first quarter of 1936, the company, by large-scale improvements in refining methods and an aggressive sales force, increased its monthly distribution to more than 9,000,000 gallons in 1939.

2. Large number of small dump deliveries. With some 2500 independent station outlets in California, of which 80 per cent are in southern California, the average delivery per tank truck call is less than 225 gallons, necessitating flexible use of fast, larger capacity distributing equipment, and an efficient routing and dispatching system.

It should be pointed out that size of dumps has been kept down by a strict credit policy. Four brands of gasoline are distributed: Polly, Super Octane, Economy and Radio.

3. Increase in transportation rates by for-hire truckers. Tariffs on petroleum products moved by contract carriers were advanced under orders of the California Railroad Commission. The new rates indicated savings could be effected by company operation of transportation equipment, in both short and comparatively long haul movement.

4. Obsolescence of existing equipment. Utilization of "outside" equipment for a large part of the company's transportation needs had placed less demand on owned equipment, and re-



Loading at the Los Angeles plant two of the 75 semi-trailer transport units operated by Wilshire Oil Co. in distributing a volume of gasoline that has trebled in the past three years. Completely meterized, this fleet has tanks ranging from one to five compartments for the various operating requirements. These single compartment units hold 3000 gallons

A new cab-over-engine delivery truck recently added by Wilshire in the San Francisco area. With an unladen weight of 15,400 pounds, its four compartments hold 2500 gallons. Overall length bumper to bumper is 23 feet 6 inches on a wheelbase of 134¼ inches. Tires are 9.00 x 20, 12 ply

placements became necessary as a part of the general revamping of the entire transportation system.

In June 1937, Wilshire owned and operated a fleet of 260 vehicles, of which 65 were delivery units operating in the Los Angeles area and at 8 substations in California.

The company's transportation department was burdened with 25 obsolete tank trucks with an average age of 13 years and an average capacity of 1907 gallons. There were also 26 light tractor semi-trailer units with an average age of four years and an average capacity of 3000 gallons. Studies indicated that four years of normal operation represented the full life of these 26 units, in that a 3000-gallon load was found to tear down the light tractor available at that time.

In addition to this equipment, the company operated eight 2000-gallon light tank trucks with an average age of three years and one new 2000-gallon light semi-trailer unit.

This assortment of vehicles had been supplemented in 1937 by five heavy semi-trailer units of 3000-gallon capacity.

Total cumulative maintenance and operating cost, not including drivers' wages or depreciation, for this fleet on a six months' basis in 1937 was $65,644.50, and the available capacity was 150,675 gallons.

The cost per gallon of capacity indicated early in the study the uneconomic feature of low capacity delivery equipment; especially when it was considered that drivers' labor—representing a cost almost double that of the truck mileage cost—was wastefully spent in returning the small capacity units to supply points for refill.

First step in the modernization program was to replace all the obsolete tank trucks which were transferred to fuel and crude oil transporting service, where mileage requirements were low. All except five of the light 3000-gallon semi-trailers were traded in on heavy semi-trailer units of 3000 and 3400-gallon capacity. In all, 59 new units were added to the fleet as replacements over a period of 18 months.

When the change-over was complete, the fleet was as follows:

Table 1

Units	Type	Capacity
4	Light Semi-Trailer	3,000
9	Light Tank Trucks	1,000
5	Light Semi-Trailer	2,000
37	Heavy Semi-Trailer	3,000
21	Heavy Semi-Trailer	3,400

Delivery, maintenance and operating costs on this modernized fleet, not including depreciation on drivers' labor, totaled $46,968.84 for a six months' period, in 1939, and the available capacity was 213,400 gallons. This represented a saving of $8675 for the period and a gain in capacity of 62,725 gallons.

Actually, 45 heavy semi-trailers were in operation during the 1939 period, instead of 37 as shown, but in order to reflect costs comparable with those under the previous operations, it was necessary to adjust the number of units to show equivalent operating mileage for comparison with 1937 operations.

Modernization of Equipment First Step in Program

Costs "before" and "after" the modernization program, plus consideration of more efficient use of driver labor, indicated savings accomplished through the use of larger capacity tank units drawn by heavy tractors.

In the experience of this company for its particular operating requirements, the element of depreciation or wear and tear was not a determining factor in arriving at comparable operating efficiencies between light and heavy equipment, since the variance in original cost of the two types was offset by longer life of the heavy tractor.

It might be stressed here that the experience of this company with light tractors was before reinforced frames, two-speed axles and generally heavier construction were built into light tractors in equipping them for moderately heavy service.

In addition to the distribution equipment outlined above, Wilshire since early in 1938 has operated fourteen 6000-gallon truck and trailer transport units in effecting bulk movement of gasoline between terminal points and substations. These operate out of terminals in the Los Angeles and San Francisco Bay areas.

Mechanical details of the new fleet of semi-trailers include tanks of 10-gauge blue annealed steel, a minimum of side skirting, four-inch internal valves, surge plates—both cross sectional and longitudinal—2½-inch meters and selective compartment manifolds. Safety features include vapor proof meter lights, muffler shield, static drag links, courtesy lights, and fire extinguisher.

The following statistical comparison illustrates the greater efficiency resulting from improvement in carrying capacity and from reorganizing the routing and dispatching system. Results are expressed in percentage changes from June, 1937.

	June 1937	Sept. 1938	Sept. 1939
Cash outlay for maintenance and operating costs, not including depreciation	100%	146%	152%
Vehicle mileage (truck and trailer as one unit)	100%	196%	227%
Cost per mile. (Not including depreciation)	100%	75%	67%

The substantial increase in mileage traveled by the new fleet was due to the development of a large bulk gasoline transport movement in 1938, to terminal expansion and to increased transportation by truck and trailer of fuel and crude oil in bulk.

The modernization of equipment was only one of the improvements initiated by Wilshire's transportation department, which is headed by C. A. Shoop, who is a Lieutenant in the U. S. Air Corps and covers most of the territory via the air route. R. W. Lindgren, assistant transportation superintendent, is a Lieutenant in the U. S. Army Infantry Reserve.

Next step in the program centered around a study to improve routing and dispatching of distributing equipment, which was regarded as important in obtaining maximum delivery and efficiency under a company operated setup.

Prior to 1937 no effort had been made to establish any standard by which route efficiency could be gauged. The first constructive step in this direction was a statement issued by the accounting department which showed performance record for the company's truck salesmen for periods. This record showed the route number, name of the driver, number of gallons delivered, number of deliveries, average gallons per delivery, number of miles traveled, hours worked, gallons delivered per mile and gallons delivered per hour.

In October, 1938, the element of di-

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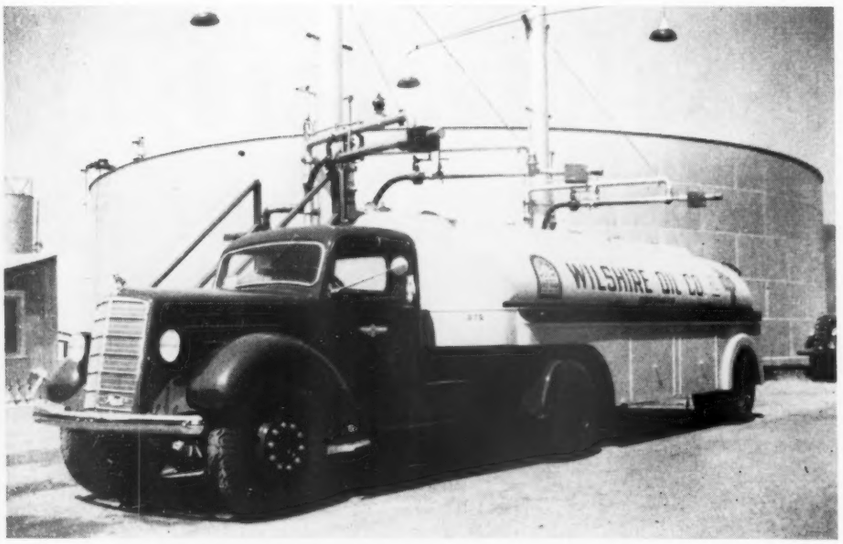

Efficient routing and dispatching of the Wilshire gasoline delivery equipment increased gallonage delivered per hour 7 per cent. This 3000-gallon, five-compartment unit, has two dual wheels on the rear single axle. Tires are 8.00 x 36. Known as the "Rainbow Fleet," Wilshire's transports are painted different colors to increase advertising value. Colors include red with black trim; white with gold trim; orange with black trim; yellow with black trim, and black

rect cost (transportation and drivers' labor) was added to this statement, reflecting current cost per 100 gallons of gasoline delivered, and this was compared with a previous three months' cost.

While this method of analysis was found very effective in reflecting route costs, it still left much to be desired in the way of individual driver control or individual measurement of driver efficiency. This was due to the fact that several relief drivers might work on a single truck in covering a route.

This need led to the establishment of a record which would accurately portray a picture of driver operations on a competitive basis. Beginning January, 1939, an extensive time study was made to determine a standard upon which to base efficient operations.

There were three important steps in laying out this program:

1. Stop-watch readings were recorded for every detail of delivery operations, including truck loading, truck servicing, customer approach time, unloading or actual delivery time at each point of call, collection time at each customer's station, report time on return from each trip, personal time and delay time.

Time Standards Set Up For Individual Routes

Each route throughout the territory was covered in this manner and a representative group of drivers were checked by stop-watch.

2. These stop-watch, route analysis reports were carefully tabulated, summarized and then studied to determine equitable "standards" for each delivery detail and these were tailored to each individual route.

3. A constant "follow-up" of actual operations is maintained to see that actual results coincide with the results indicated by the time study. It was found that conditions change over the various routes. Traffic increases, stop signals are added at intersections and other factors arise to affect time and delivery operations. This necessitates rechecking routes and fixing of new standards.

In determining these time standards, the following details of delivery operations were studied:

Loading time: Includes period from time truck stops under discharge outlets of loading rack, until ignition is turned on preparatory to leaving rack.

Driving time: Starts as driver leaves loading rack and ends when he turns off ignition switch at customer's station or delivery point. Starts again as he turns on ignition to leave station.

Approach time: Starts at station when ignition switch is turned off, includes discussion of customer's needs and ends when gasoline hose is pulled from carrier.

Delivery or Unloading time: Starts as driver takes out gasoline discharge hose and runs until hose is back in carrier and fill pipe cap is replaced.

Collection time: Includes period from end of delivery operation until truck ignition is turned on preparatory to leaving station.

A summary of tabulated information, as reflected from time cards and trip reports, was worked up to show for each driver his actual time for a given period in his delivery operations and the time that should have been taken, based on the company's studies. An "indicated" time of 6972 minutes, for example, was based upon the average time required per delivery, per mile of travel, per 100 gallons, per days worked and per trip for the individual route, as set up from the company's previous studies.

For each "day worked" during the period under consideration it was found each driver spent some time in securing the truck in the morning and in putting it away at night, and in servicing the truck. Also included under this is an allowance for personal time and delayed time.

Actual time is based on the total number of hours worked, multiplied by 60 minutes. The difference between this figure and the indicated time is the theoretical saving or loss during the period. This difference divided by number of hours worked gives the minutes gained or lost per hour. In the company's reports, the time lost is shown in red.

Three months after the adoption of this routing and dispatching program the gallons delivered per hour increased seven per cent. This was accomplished even though the average number of gallons per delivery was lower in the subsequent period.

The following comparison shows the percentage gain in time required for delivery operations after the new program had been in use for several months:

	Dec. 1937	June 1938
Gallons delivered per hour ..	100%	103%
Av. gallonage per delivery..	100%	100%

	Feb. 1939	June 1939
Gallons delivered per hour ..	102%	107%*
Av. gallonage per delivery ..	98%	98%

* After the time study had ironed out inefficiencies in delivery operations.

It is pointed out by Wilshire's transportation department that the greatest savings were realized by a logical approach and analysis of delivery operations on the following two points:

1. Route revision to accomplish maximum gallonage throughput with minimum mileage.
2. Correction of delivery technique or practice followed by individual drivers to show variance from standards of performance established by other drivers.

The program also serves as an invaluable guide in management planning, by permitting accurate estimate of delivery costs preliminary to market expansion, and by affording a gauge in choosing between company and other types of transportation.

In no way is the analysis of delivery operations considered or used as a "pressure tactic" on individual drivers, but is intended to demonstrate

Non-refillable oil or anti-freeze can—1 qt.
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Full opening friction cover grease can—1 lb. to 25 lb. sizes.
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more efficient use of time and the greater safety resulting from "standard" procedure. In actual practice, when it is found that a driver is consuming an unusual amount of time, as shown by his performance record, a route foreman goes along on the truck to check time taken by the driver for the various operations against the standards previously established for that route.

Only at rare instances was the driver found to be soldiering. Perhaps traffic or other conditions had changed to warrant the slower time, or perhaps the driver has never been properly instructed as to the proper routine to follow.

Two primary factors stressed by the company are: 1. Maintenance of customer goodwill as a result of prompt and courteous service and 2. Emphasis on safe driving. In no case is the time required for the truck to travel its route in excess of a safe speed limit.

Because the time required for functions which go to make up the "indicated time" vary widely with each individual route, no average can be set forth, but must be predicated upon the experience of individual operations.

As a further step in its revamped transportation program, Wilshire initiated in its Los Angeles garage a system for recording work orders issued by the truck drivers when repairs are needed.

UNDER the new setup, a bound book with original and duplicate forms is assigned to each truck and kept in a special compartment. When mechanical work is required, the driver indicates in a written report the exact nature of the trouble.

Upon completion of the work, the garage foreman records what was done, signs the order and removes the original copy for his files. The order book containing the carbon is replaced in the vehicle and constitutes a log book reflecting maintenance work on the individual equipment over a period of years.

A particular advantage of this method is to create a direct line of responsibility from the driver to the mechanic to the garage foreman and to eliminate the danger that needed repair work was not performed.

Another improvement in maintenance technique has been to check the mechanical condition of each vehicle at 4000-mile intervals as a means of avoiding serious mechanical failures and operating delays while the equipment is in operation.

The result of this procedure has been to iron out the highs and lows in garage maintenance. Preventative maintenance work for the entire fleet of over 300 vehicles is scheduled 30 days in advance. However, this schedule is adjusted currently to compensate for the sharply varying volume of urgent and emergency repair work which may be necessary.

Barge in Lock No. 5 of the New York barge canal, near New York, on return trip after delivering 440,000 gallons of petroleum products

N. Y. Harbor Oil Gateway To Huge Inland Territory

WATER transportation of petroleum products probably has reached its greatest stage of development in the east, particularly for internal shipments from the New York Harbor market.

While major companies were the first to take advantage of the cheaper method of transporting of petroleum from the New York market, independent marketers progressed almost in step, even though it forced them to erect larger storage, and increase their investment, with more complete and modern bulk plants. Now independently owned and operated terminals dot the area around New York City and northern New Jersey, on the Hudson River and the New York state barge canal, as well as the Connecticut River and the lower sections of this state bordering on the Long Island Sound.

In almost all other sections along the Atlantic seaboard, where navigable waters and consumption volume permits, there the oil market industry—both independent and major—has established its bulk plants on water.

As the independent marketers kept pace with the larger companies the rate of development of water transportation and distribution of petroleum has slowed up recently in some areas supplied from the New York Harbor. However, this development has by no means stopped. This is shown by the increase in receipts of petroleum products by water at representative points where independent and major companies have established their water terminals.

New water bulk plants established the past several years, plus additional tankage erected at already existing barge terminals are continuing to divert the shipment of petroleum from other forms of transportation to the waterways. As shown by the accompanying table of representative points which receive petroleum supplies by water from the Harbor, receipts have increased considerably more than the attendant increase in consumption of these products, indicating that wider areas are being served by rail or transport truck from the barge terminals.

Receipts of gasoline, for example, at the port of Stamford, Conn. for 1937 were up nearly 300 per cent from receipts at this port in 1934, according to figures of the U. S. Engineers. Gasoline moving through the New York state barge canals system in the same years increased 34.6 per cent, while receipts of gasoline at Hartford and Albany were up 76.4 and 57.9 per cent, respectively, in 1937, as compared with 1934.

The New York Harbor wholesale petroleum market has two functions—receiving crude and refined petroleum from other refining districts — and manufacturing and transshipping this petroleum to independent and major company barge terminals located in the areas of consumption.

Some idea of the growth of the harbor as an import center is shown by government figures which reveal that the total receipts of all petroleum products in the greater New York Harbor market for 1928 were 2,612,429,400 gallons. This had jumped to 4,049,043,600 gallons by 1933, and in 1937 totaled nearly 7,500,000,000 gallons of all products.

Total petroleum received in the New

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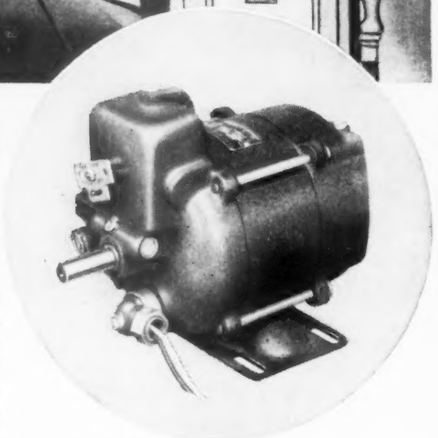

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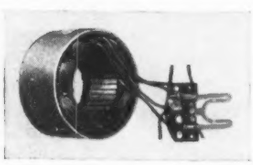

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York wholesale market by water in 1937 was four times greater than the 1938 gasoline consumption of New York, the largest consuming state in the country. Or, to put it another way, these receipts were nearly twice the combined 1938 gasoline consumption of New York, New Jersey, Connecticut, Maine, Massachusetts, New Hampshire and Vermont.

Roughly, the import area of the market receiving coastwise and foreign petroleum covers the greater New York City district. This includes the lower and upper bays of New York Harbor, Newark Bay, the Hudson, Passaic, Hackensack and East rivers, and Arthur Kill and Kill Van Kull. Waters of the latter two kills are on the north and east of Staten Island, with terminals and refineries on the New York and New Jersey sides. Tanker terminals also are located at Albany.

The area which New York supplies is confined at the coast by Philadelphia on the south and Providence on the north, or from about the center of the state of New Jersey to the Connecticut River.

The area where petroleum, which was received at the harbor, is consumed, widens, or fans out, as it moves inland. Oil moves up the Hudson River and into the New York state canal system, and is transshipped from water terminals on these waters further inland by rail and transport trucks.

In this manner the Harbor serves virtually all of New York state, the northern half of New Jersey, the western three quarters of Connecticut, as well as parts of Pennsylvania, Massachusetts, New Hampshire, Vermont, with some occasionally moving across the border into Canada.

As stated before, the New York Harbor import market received nearly 7,500,000,000 gallons of petroleum in 1937. It is interesting to note where this petroleum originated, and where it finally gets off the waterways.

The U. S. Engineers report shows the following breakdown of receipts of all petroleum products for 1937 in the Port of New York:

	Gallons
Internal	4,356,198
Foreign	1,469,614,486
Coastwise	6,002,534,202
Total Receipts	7,476,704,886

Some of the imports shown were crude oil. This was taken in by refineries for processing and the products shipped into internal, coastwise or export markets. The refined products received in the market were brought into tanker terminals of major companies, independent refiners, or suppliers. They were then broken up into barge lots for sale and shipment to barge terminals along the shallow waterways. It is impossible from government figures, to determine the amounts of petroleum products which moved from the New York Harbor to independent brand and major brand

marketers, and to major company-owned barge terminals. However, shipments from the harbor in 1937 were split up as follows, according to the engineers reports:

	Gallons
Export	252,893,508
Coastwise	1,001,342,244
New York Harbor and Interior	4,600,259,454
Total shipment	5,854,495,206

Although government figures do not show, it is assumed that the difference between the import figure and the shipments figures— nearly 2,000,000,000 gallons—was consumed locally, shipped in transport or by railroads direct from New York Harbor terminals or refineries where it was received.

The savings made through water transportation, as testified by some 86 independent eastern marketers operating water terminals in the east before a Congressional hearing, are passed along to the consumer. Because the margin of profit is not wide enough to permit the independent marketer to pay the difference between rail freight and still compete against products transported by the cheaper water carriers, he has been literally forced to the water's edge.

Interesting commentary on what water transportation versus rail transportation of petroleum products means to the industry and to the consumer in eastern areas served out of New York can be found in following table of comparative rail and water rates. The table shows the rail rate to Hartford, Conn., is 60.9 cents per barrel, compared with 12 cents per barrel by water. This is less than three tenths of a cent per gallon by water as against 1.45 cents by rail. The full cent difference, marketers say, has been passed along to the consumer, and it would be impossible for a marketer to ship by rail and still be competitive in this area.

Comparative Water and Rail Rates To Representative Points

Destination	Base Water Rate From New York Cents Per Bbl.	Rail Freight From N. Y. (F.O.B. Bayonne) Cents Per Bbl.	Rail Freight From Bradford, Pa. Cents Per Bbl.
New York Harbor (Barging charge for harbor movement)	.05	.....	....
Stamford, Conn.	.07	47.04	....
New Haven, Conn.	.08	55.44	....
Hartford	.12	60.90	....
Peekskill, N. Y.	.06	44.10	....
Poughkeepsie	.07	49.98	....
Albany	.085	60.90	....
Passaic, N. J.	.04	22.26	....
Schenectady	.11	60.90	83.1
Utica	.189	71.82	74.7
Syracuse	.2604	77.70	66.3
Rochester	.3024	86.10	36.1
Buffalo	.3318	91.56	28.9

Barge rates shown in the above table were supplied by Oil Transfer, Inc., independent transportation company. These are base rates, predicated on cost, and might fluctuate somewhat

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★ The advantages outlined above are revolutionary, but there is no guesswork about them . . . all have been proved by the everyday experience of users—experience which demonstrates conclusively that ECONO-VENT provides *greater* protection than has ever been possible before, plus complete freedom from mechanical attention, plus *50% to 75% savings in evaporation and storage losses* . . . To delay investigation of ECONO-VENT is to postpone its advantages.

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SAVE WITH Econo-vent LIQUID SEAL TANK VENT
The New Type Tank Vent with the Revolutionary LIQUID SEAL

Total Receipts of Petroleum Products by Water at Points in Area Served from N. Y. Harbor

(Figures taken from latest U. S. Engineers Report)
(Figures in Barrels)

	1937				1936				1935				1934			
	Gasoline	Kerosine	Fuel Oil	Bunker "C"	Gasoline	Kerosine	Fuel Oil	Bunker "C"	Gasoline	Kerosine	Fuel Oil	Bunker "C"	Gasoline	Kerosine	Fuel Oil	Bunker "C"
Stamford, Conn.	264,726	40,096	659,809	119,568	148,332	17,276	343,435	92,607	78,224	.....	430,140	80,152	67,713		486,654	
% Increase over 1934	290.0%															
New Haven, Conn.	1,983,997	1,088,367	1,848,020	2,611,150	1,793,930	925,925	3,024,266	2,213,572	1,291,759	762,524	1,909,533	189,837	1,550,487	990,514	1,456,975	517,970
% Increase over 1934	27.9%	9.9%	26.8%	404.1%												
Hartford (1)	3,052,665	1,027,382	2,114,486	770,855	2,422,851	859,719	1,651,034	1,157,036	1,688,332	816,669	1,246,320	792,583	1,730,143	816,193	1,288,282	434,903
% Increase over 1934	76.4%	25.9%	64.1%	77.2%												
Peekskill, N. Y. (3)	88,442	24,325	25,098		95,333	12,285	25,681		102,363	7,875	13,085		86,039	1,449	19,978	
% Increase over 1934	2.79%	1578.7%	25.6%													
Albany	9,173,056	858,452	3,441,347		8,417,347	614,635	3,556,319		7,110,334	453,404	2,323,446		5,808,317	543,235	1,374,719	
% Increase over 1934	57.9%	58.0%	150.3%													
Passaic, N. J. (2) (3)	4,129,833	4,570,804	1,008,664	1,274,547												
Troy Locks to N. Y. Canal System, Great Lakes & Canada	11,809,582	950,012	3,729,153		10,483,965	1,163,946	3,284,011		9,958,209	749,455	1,860,683		8,769,206	729,820	2,051,506	
% Increase over 1934	34.6%	30.2%	81.8%													

(1) Includes entire Conn. River Ports below Hartford.
(2) Passaic River receipts, early figures not available.
(3) Internal and Coastwise receipts included.

with increased or decreased supply of barges available for shipping.

The transition from other forms of transportation to water brought some problems to independent marketers, operating either as branded distributors or as unbranded marketers. One was the provision for an adequate supply when waters were frozen over and it is impossible to get supplies by barge.

This one fact alone has resulted in marketers establishing larger storage, and in general larger bulk plants, than are found in inland sections of the country. Barge plants with 5,000,000 gallons storage are not uncommon among independents in the east, with some of these barge terminals running between 10,000,000 and 20,000,000 gallons.

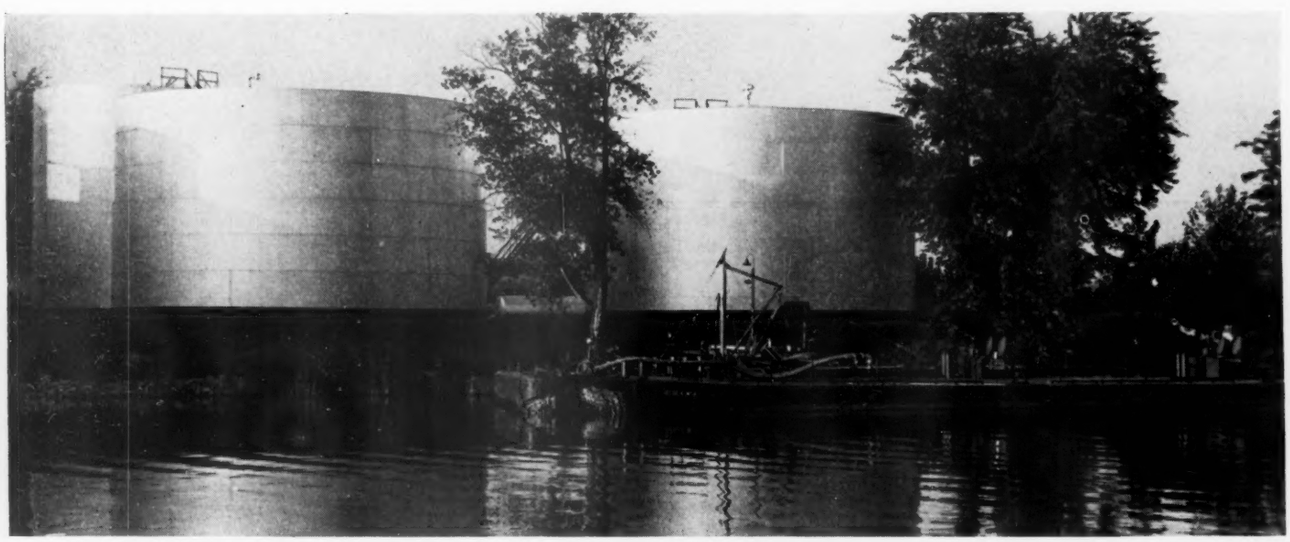
The amount of storage which the marketer must erect for water operation, however, depends to a great extent on whether his business is mainly gasoline or fuel oil; the volume of products he sells when the rivers are not navigable; as well as the length of time he may gamble on the river being open.

Some marketers which deal mainly in gasoline say that they find that, while the winter closes up their water supply of products for several months, it also cuts gasoline consumption to a point where hardly more storage is needed to carry them over the entire closed-in period, than is needed to carry on operations during the summer at peak consumption when supplies can be received continuously.

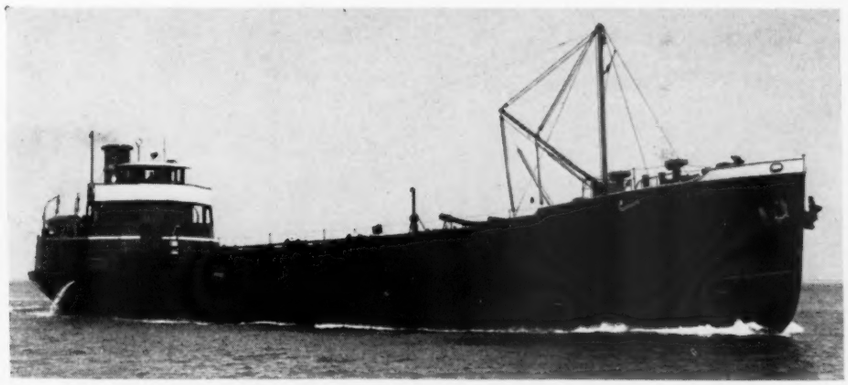
On the other hand, however, the East is the No. 1 market for domestic fuel oil in the country, with the bulk of this demand coming at a time when it is impossible to get supplies by water. Marketers specializing in fuel oils, therefore, must and do have considerably more storage than a gasoline marketer.

Too, barges serving this territory are of such capacity that larger storage than would suffice for an inland plant must be erected to accept shipments in this manner. While small barges of 80,000 gallons capacity operate out of the New York Harbor (exceptions for this area are extremely small motorships running as low as 25,000 gallons), the majority carry between 200,000 and 800,000 gallons, with the average between 400,000 and 500,000 gallons.

Speed of barges is limited to 10 miles per hour on rivers and lakes; six miles per hour on improved canals; and four miles per hour maximum on improved canals having bottom width of 50 feet or less. Moving petroleum by barge is a slow process, and the marketer must take this into consideration if he is contemplating transporting his supply in this manner. It takes 10 to 12 days to make the round trip from New York Har-



Barge unloading gasoline at terminal of Hartol Products Corp. at Baldwinsville, N. Y., on the New York barge canal. Terminal has 3,255,000 gallons capacity



Motor vessel owned and operated by Spentonbush Fuel Transport Service, Inc. It has capacity of 465,850 gallons and operates along the northern Atlantic Coast and tributaries. It has 12-foot, three-inch draft when loaded and carries a crew of 10. It has two six-inch unloading pumps of 850 gallons a minute capacity and can discharge its cargo in 6 hours through six-inch line

bor terminals and refineries to barge terminals in Buffalo. The two-way trip between Hartford and New York takes three days.

Generally, the rate to destination includes cargo insurance. Insurance on the hull on the return trip is carried by the transportation company.

Tanker terminals and refinery loading docks in the New York Harbor import area are on waters which are navigable the year around. However, barge terminals along the New York state canal system must have sufficient storage so they can be without supply by water from the latter part of November until the middle of April. Waters north of Albany generally are closed by winter about the same time as the barge canal.

The Hudson River is generally open the year around below Peekskill, with navigation closed above this city to Albany from one to three months of the year.

Marketers with water bulk plants along these waterways continue to crowd storage—keep it full as possible —against the time when the freeze-up comes.

Petroleum products, purchased by marketers drawing their supplies out of the New York Harbor market, are bought on contracts, or in the open market either on a laid-down basis—that is, f.o.b. marketer's shore tanks, or f.o.b. seller's terminal.

In the first case, the seller negotiates for the barge to transport the material to the marketer's barge terminal. The price paid includes the freight to destination. However, in the event of a purchase f.o.b. seller's terminal, the marketer contracts with the transportation company to haul the petroleum to his plant, and pays for the products and the transportation separately.

The marketer using water need have no technical knowledge of shipping, or its problems. Transportation companies quote rates to all shippers and the products are handled as completely as by other forms of carriers.

Barges are owned by large oil companies and by independent transporta-

Petroleum received at water terminals moves out in local, transport trucks and by rail. Picture shows combination truck and rail loading rack at marine terminal of Hartol Products Corp., Bayonne, N. J.

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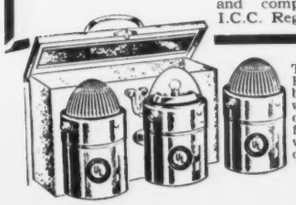

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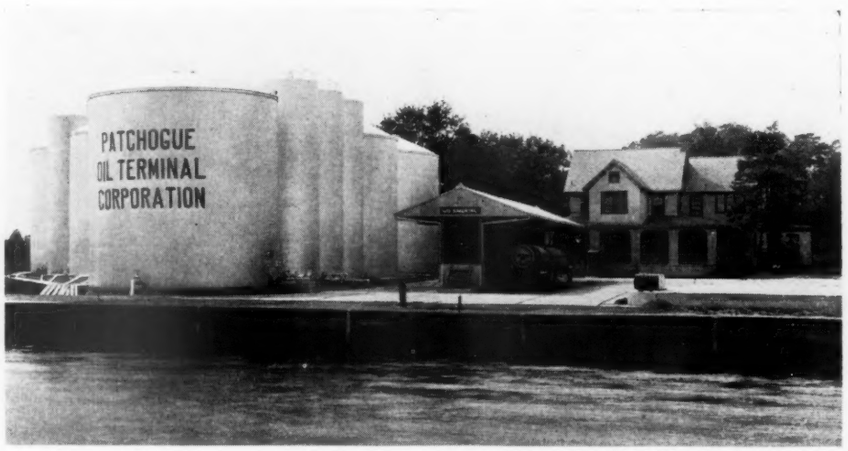
tion companies. The marketer orders a barge of certain tonnage, specifying loading date, with any of the transportation companies, or he can place his order for a boat through brokers in the harbor. In either event, at the present time there is sufficient tonnage available so that the marketer will not have to wait. At times of peak delivery—in the spring when navigation opens, and in the fall just before it closes—marketers may be forced to pay a premium to get barges for early position.

A representative of one transportation company estimates that there are about 500 barges, both motorships and dead units, operating in the New York Harbor area. Another representative of a transportation company said that the New York barge market was "over tonnaged."



Throughput barge terminal used by several companies for local distribution on Long Island, located on the south shore of the island at Patchogue. Plant has storage for 2,000,000 gallons in 12 tanks, and is erecting eight new tanks to hold 1,250,000 gallons additional storage

MARINE men in the harbor say that a marketer can establish his bulk plant on any navigable water in this area with a ten foot draft, which is the average draft of a barge. However, larger barges draw as much as 21 feet, with the smaller boats around seven feet.

All different grades and types of petroleum are transported by barges. In fact, one of the larger companies moves some of its cased oil via water on the decks of barges. No additional charge is made by transportation companies for carrying split cargoes—two or more different grades of gasoline or light fuel oil.

For barging of No. 6, or heavy industrial fuel, special barges with steam coils are used. Steam circulating in the coils keeps the oil so it will flow easily during cold weather. These "dirty" boats are kept in this trade because of the expense of cleaning them.

Barge terminals in the east have at least two unloading lines, generally six-inch pipe, from the water's edge to the plant's storage. Barges operating out of the New York Harbor vary widely in size and equipment. Products are unloaded through pumps carried on the barge. These pumps are operated by either steam, gasoline or diesel motors. The gasoline and diesel motors are carried on the barges, while those requiring steam get their power either from shore lines, or from the tug.

Ship-side, or lightering of petroleum is another way it is handled from tankers into barges, and then into marketers' terminals. However, this operation is slightly more expensive than barging directly from a tanker terminal, according to barge men. The ocean-going tankers drop anchor in the upper or lower bays of the Harbor and the barge comes alongside. Products are then pumped direct from the boat into the barge. Companies which do not operate tanker terminals in the Harbor have sold products on this basis, but sales of this type are more the exception than the rule. These tankers carry up to 3,000,000 gallons, which means that four or five barges have to be in position to come alongside so as to prevent demurrage from accruing on the tanker. Heavy seas sometime make such ship-side unloading difficult and delay unloading.

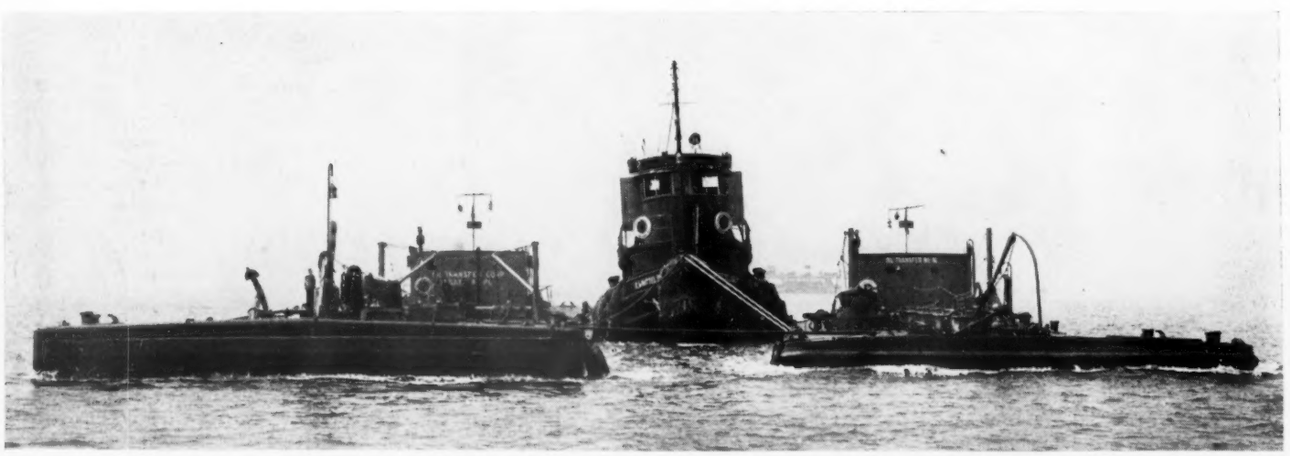
Independent's Terminal of 11,000,000 Gal. Capacity

The following brief description of the bulk plant owned and operated by the American Coal Co. on the Connecticut River at Hartford will give a quick picture to inland marketers of what constitutes an eastern independent barge terminal, and, a general idea of how it operates.

American Coal is a local brand gasoline marketer, and sells three grades of fuel oil for home consumption, and No. 5 industrial grade.

This company purchases its material from sellers in the New York Harbor market. All grades of gasoline and fuel oil are barged through the Long Island Sound and up the Connecticut River to Hartford.

Besides its own distribution, Amer-



Three quarters of a million gallons of gasoline move up the Hudson River in the care of a tug

ican supplies transporters who haul from Hartford into lower Massachusetts. The company also sells to what are aptly called "peddlers" in the east. The function of these peddlers is to distribute kerosine to their own customers. The practice of selling this type marketer—the peddler—is quite general throughout this area.

The company also terminals material for a large company without a water plant in Hartford for a terminaling charge.

The American Coal terminal has 11,000,000 gallons storage in nine tanks.

N. Y. Harbor Suppliers

Oil companies supplying branded and unbranded petroleum products in barge lots, operating in the New York Harbor wholesale market, not including brokers, are listed below. The list also shows probable points of origin of products sold in this market.

American Mineral Spirits Co., connected with Amsco Refining Co. at Corpus Christi, Tex.

Atlantic Refining Co., refineries at Atreco, Tex., and Point Breeze (Philadelphia).

Barber Asphalt Corp., asphalt and cracking plant at Barber, N. J.

Jas. B. Berry Sons' Co.

Cities Service Oil Co., refineries at East Braintree, Mass. (Boston) and Petty's Island, N. J.

Continental Oil Co., refinery at Baltimore.

Crown Central Petroleum Corp., refinery at Houston.

Gulf Refining Co., refineries at Philadelphia, Staten Island, N. Y. and Port Arthur, Tex.

Hartol Products Corp.

Maritime Petroleum Corp.

Pan American Petroleum and Transport Co., refinery at Texas City, Tex., and affiliated with Mexican Petroleum Corp. refinery at Savannah, Ga., and American Oil Co., with refinery at Baltimore.

Petroleum Heat and Power Co., affiliated with Pan American.

Republic Oil Corp., refinery at Texas City, Texas.

Royal Petroleum Corp., affiliated with Southwestern Oil & Refining Co., with refinery at Corpus Christi.

Richfield Oil Corp. of New York., subsidiary of Consolidated Oil Corp. (Sinclair)).

Shell Oil Co., refineries at Norco (New Orleans), La., and at Houston, Tex.

Sinclair Refining Co., refineries at Houston and Marcus Hook, Pa.

Standard Oil Co. of New Jersey, refineries in N. Y. Harbor.

Socony-Vacuum Oil Co., refineries in N. Y. Harbor.

Sun Oil Co., refinery at Marcus Hook, Pa.

The Texas Co., refineries at Houston, Port Neches and Port Arthur, Tex.

Tide Water Associated Oil Corp., refinery in N. Y. Harbor.

This represents about 60 days' supply for the company. Storage is kept full as the end of the navigation season approaches. While U. S. Army Engineers say that the season for navigation on the Connecticut River is usually closed from Dec. 15 to March 15, it has been closed for only short periods during the past five years.

This terminal has five six-inch unloading lines from the river edge to the plant. It also has another line running from the plant to the river which can be used to pump water into tanks if they should be low, to anchor

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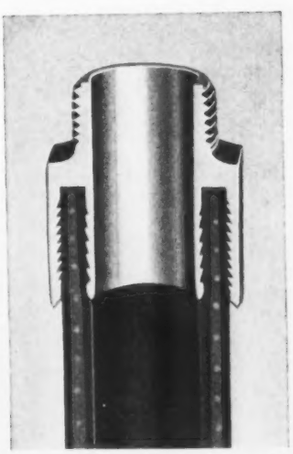

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them in case of a flood. A separate pump, driven by a gasoline motor, is kept on high ground to pump water into tanks in case of a flood.

The plant has three two-spot loading racks, and a separate loading station for No. 5 oil. It has a battery of four 15,000-gallon horizontal tanks on uprights. These tanks can be used to load trucks by gravity through meters when the large storage tanks are being filled from barges. These tanks also are pressed into service when transferring materials from one tank to another, or when cleaning the large storage tanks.

The terminal is completely manifolded through valves, which allow drawing from any tank through any outlet on the three loading racks, or pumping to the horizontal tanks. Separate storage, pump and loading spot is provided for No. 5 oil to prevent contamination.

Pumping of all products, except No. 5 fuel, is done through 10 centrifugal pumps of 300-gallons a minute capacity. They are powered by 10 electric motors of five horsepower each. All outlets on loading racks are meter equipped, the plant having 16 in all.

New Terminals Built In The Southeast

CLEVELAND, Dec. 11.—Two new terminals and the expansion of a third by one company featured the 1939 developments in waterway transportation of petroleum products to southeastern markets.

The Republic Oil Co. of Pittsburgh, constructed new terminals at Fayetteville, N. C., and at Tampa, Fla., and enlarged its terminal at Wilmington, N. C. Storage capacity of the new installations total 236,000 barrels, giving the company a total storage at all of its terminals of over 1,800,000 barrels of refined products.

The Fayetteville terminal is on the Cape Fear river, 80 miles inland from the deep water terminal at Wilmington. Five storage tanks, each of 13,000 barrels capacity, were erected at Fayetteville. Products will be hauled by barge from the Wilmington terminal.

The deep water terminal at Tampa will be ready for use early in January. It will have five storage tanks of 25,000 barrels each.

Further expansion of the Wilmington terminal was found necessary and three additional tanks of 12,500 barrels capacity each were erected.

The company installed the latest type equipment at the three terminals, including meters for accurate loading of tank cars and transport trucks. It maintains 24 hour a day service at the terminals.

The company's refinery at Texas City is being enlarged at a cost of approximately $1,250,000. A large canning and drumming plant is being installed, in addition to a new refining unit.

Barges Move Oil 200 Miles Up Columbia River for the California Oil Companies

RECENT improvements in navigation on the upper Columbia River, in the far northwest, permit California oil marketing companies to use a combination of barge and trucks to reduce costs of distribution into this important marketing territory of eastern Washington and Oregon and western Idaho.

An annual upstream movement is indicated of approximately 100,000,000 gallons of gasoline, plus smaller shipments of diesel and stove oil, in the face of growing competition for this market by products refined from Montana crude. It was brought about by the high rail and truck rates from northwest coast points to this "Inland Empire".

Important developments in connection with this movement, which may have a far reaching effect in pointing to new economies and efficiencies in the combined use of water movement and trucking of oil products, include:

1—The use of the commercial navigation lines for distances up to 227 miles above enlarged supply depots at Portland, Ore.

2—Savings of 12 to 16 cents per 100 pounds under previous through rail and truck rates from coast points to the Spokane area.

3—Increased use of company-owned transport trucks in effecting bulk distribution beyond river terminals.

4—Joint operation of a large river terminal by four California oil companies, to reduce their distributing costs.

Completion of the Bonneville Locks and other improvements included in the more than $83,000,000 program of the federal government to promote commercial navigation and use of the Columbia River have made it navigable up to Attalia, Wash., about 227 miles by river east of Portland, Ore., and just below the mouth of Snake River.

This is well within the gateway of the important "Inland Empire" consuming area, including eastern Washington and Oregon and western Idaho, which in 1937 represented a market to California oil companies of approximately 140,000,000 gallons of gasoline annually.

For the future, plans are now under way for improving the Snake River as far as Lewiston, Idaho. If these are carried through, tug-propelled river barges will open new territories to the products of California refiners.

To date, however, terminal facilities have been constructed on the Columbia river bank at Attalia and at Umatilla, Ore., 200 miles upstream from Portland supply points, and at The Dalles, 93 miles above Portland. Facilities at these points are now primarily for the handling of gasoline—three grades for each company represented—together with some diesel oil. As demand warrants storage will be provided for other products.

Faced with growing competition for the "Inland Empire" market by Montana refineries, which turned west when their Canadian markets were cut off, and by several independent plants recently constructed in the Spokane area, built to operate on Montana crude, California suppliers began using the Columbia River as a means of reducing costs on the long haul inland.

Former practice was to use rail or truck and trailer transports to move bulk gasoline from main storage points at Seattle and Portland to this inland territory, of which Spokane is by far the most important point. The tariff by either rail or truck from either of the coast points to Spokane was 41 cents per 100 pounds, as compared with a combination barge and truck movement from Portland to Spokane of about 25 cents, under private operation.

California shippers are using commercial barge lines for the water haul above Portland, where large supply depots are filled by tankers from California refining centers. These barge lines are the Inland Navigation Co., which operates as far as Umatilla, and

Completely meterized, even down to fuel deliveries to transport trucks, this community loading rack at the Umatilla terminal has individual loading lines on the three grades of gasoline shipped by the four participating oil marketers from this distributing depot

Oil Barged 200 Miles Up Columbia River

Four California oil companies joined in the construction and operation of this 3,000,000-gallon terminal on the banks of the Columbia at Umatilla, Ore., approximately 200 miles upstream from Portland. Supplied by river barges, individual company products are stored and distributed through separate facilities, but at reduced operating costs

the Tidewater Navigation Co., which operates to Attalia.

The former provides tankage at The Dalles for 1,300,000 gallons of petroleum products, which has been used by various California marketers for the past two years. This barge line has been operating to Umatilla since May of this year, delivering into storage owned and operated by four companies on a joint basis. Terminal facilities are also scheduled for completion at Arlington, Ore., half way between The Dalles and Umatilla.

This barge company has one diesel-powered motor vessel, the Inland Chief, with divided tank compartments. The barge can take 250,000 gallons as far as The Dalles but only 200,000 gallons above this point, because of decreased draft. A covered deck makes it possible to haul package goods, sacked grain, wool or other farm products downstream to Portland.

At present, this boat could handle about 1,000,000 gallons a month to Umatilla, for six months of the year. At a recent Interstate Commerce Commission hearing covering freight rates in this area, it was revealed that the Inland Navigation Co. contemplated the purchase of a tug-boat and five 200,000-gallon barges for use between Portland and Umatilla. The tug would be used to haul barges above The Dalles.

Inland's rate on petroleum products from Portland to either The Dalles or Umatilla is 0.5 cent a gallon, or about 7.5 cents per 100 pounds, and includes insurance, evaporation losses, storage, transfer to trucks or tank cars at The Dalles, and the clerical work in connection with reshipment at that point.

It was revealed at the hearing that, in 1938, the Inland Chief traveled 8635 miles carrying 21,778 tons of petroleum products to The Dalles and 15,700 tons of wheat downstream. With sufficient business it was estimated a total of 94,000 tons could be carried a distance of 26,000 miles, making 130 trips; and that the total cost of this traffic between Portland and The Dalles would be 96 cents a ton, or slightly in excess of 5 cents per 100 pounds.

If the movement were continued to Umatilla, it was estimated the cost would be increased 5 cents per 100 pounds, or 10 cents to this point from Portland. However, if the Inland Chief were used to The Dalles and a tug propelled barge from here to Umatilla, the cost was placed at about 8.75 cents per 100 pounds, on the basis of an annual petroleum traffic of 39,000,000 gallons.

The other barge line, the Tidewater Navigation Co., now operates with three tow boats and five barges. Two of the former—tunnel-type, twin-screw, diesel-fueled — operate above The Dalles. The barges are divided into tank compartments, are of light draft and are specially designed for the shallow waters and swift currents of the upper river. Three of the barges have capacity for 200,000 gallons each, another holds 105,000 gallons and the fifth barge has a fluid capacity of 125,000 gallons and can take 300 tons of bulk wheat in special compartments at each end.

Besides petroleum products, it is anticipated that commodities such as sugar, salt, food stuffs, heavy hardware, iron and steel, building materials and other package freight will be available for movement upstream, and wheat, wool and potatoes for a return payload.

This barging company, whose general manager is distributing agent for General Petroleum Corp. at Attalia and in the Spokane area, has a storage capacity at Attalia of approximately 2,500,000 gallons. This tankage is assigned to the use of individual California refiners, including General Petroleum and Shell Oil Co.

Since the completion of Bonneville Dam and Locks and improved navigation of the upper Columbia to Attalia, this company has been moving about 2,000,000 gallons a month from Portland to Attalia. Under favorable conditions, it is possible to transport about 3,500,000 gallons a month with the present equipment, making four round trips and requiring four days per trip.

Some idea of the increase in transportation of petroleum products along the Columbia River is gained from the fact that movement to Attalia was 1,330,000 gallons in 1937 and 7,454,427 gallons in 1938. Movement to both Attalia and Umatilla the first six months of 1939 was approximately the same as that to Attalia for all of 1938, although the Umatilla terminal was not completed until late in June 1939.

An important development in connection with the movement of oil products up the Columbia and into the "Inland Empire" via Attalia, is the use of oil company owned trucks to complete the haul from the river terminal.

In the recent ICC hearing it was pointed out that Shell, which began moving products through Attalia late in February of this year, transports almost all its gasoline from that point into the Spokane area in its own trucks. It operates two units leased from common carriers and recently added two new semi-trailer units of 5400-gallon capacity.

The leased units include a 5200-gallon semi-trailer and a 6000-gallon truck and trailer assembly. The equipment is leased at a cost of $600 per month for each unit, with Shell furnishing the drivers and bearing all operating costs. It was estimated that approximately 10,000,000 gallons could be handled annually, with the four trucks making about 40 round trips per month. It was also estimated by the oil company that these trucks could be operated at a cost of 15 cents per mile.

It was revealed that Shell intended to do its own trucking, at least as long as present rates from Attalia to Spokane remained. For example, the rate is 25 cents per 100 pounds from Attalia to Spokane.

General Petroleum's distributing agent in the Spokane area, who is the general manager of Tidewater Navigation, has been operating his own trucks in making deliveries out of Attalia. Standard Oil Co. of California, testimony at the hearing brought out, has leased four tank trucks at $400 per month each, to move products out of Umatilla into the Spokane area. However, in general contract carriers are used for distribution from Umatilla.

It should be pointed out that some complication arises in the truck movement of products interstate between Oregon which allows a gross vehicle weight of 54,000 pounds, preventing use of unit capacity of more than 5000 gallons, and Washington and Idaho, which allow 68,000 pounds, or a 6000-gallon limit. To avoid this restriction, contract carriers operating out of Umatilla into Washington or Idaho, move the truck and trailer separately a distance of 20 miles to the Washington state line, where they are reassembled as a single unit for the rest of the trip.

Asbury Transportation Co., a contract carrier seeking to establish a rate of 17 cents per 100 pounds from Umatilla to Spokane, proposed the use

of the newest type diesel-powered truck and trailer units, which it indicated could be run at a cost of about 3 cents per mile less than gasoline powered equipment then in general use.

Its study indicated the cost of this service, all things considered, allowing half a cent per truck mile for a 5¾ per cent return on depreciated book investment on all property, including working capital, would be 17.13 cents per truck mile or about 17 cents per 100 pounds for the 392-mile round trip. The truck rate between Umatilla and Spokane was later prescribed at 19 cents by the ICC in I. & S. Docket No. 4614.

One of the most interesting developments to come out of the increase in transportation of petroleum products on the Columbia River, is at Umatilla where four large California marketers operate a new bulk terminal and distributing depot on a joint basis.

The plant site consists of 14 acres of land away from the river and seven acres of waterfront. This property was originally acquired by Standard Oil Co. of California, which later leased sites for tanks and other facilities to Union Oil Co., The Texas Co., and Richfield Oil Corp.

Built at a cost of $100,000, this plant has a total storage capacity of about 3,000,000 gallons, with Standard having 1,250,000, The Texas Co. 525,000, and Union and Richfield, 600,000 gallons each. It is estimated throughput of the three grades of gasoline to be handled will be in the neighborhood of 50,000,000 gallons a year, for the present. Indications are that approximately 100,000,000 gallons will be moved by barge and truck or rail combinations into this area a year.

Moorings for the river boats or barges, main cargo lines from the dock to storage and other miscellaneous facilities will be operated jointly by the four companies. Each company has its own storage tanks, connecting lines to the main cargo lines and their own outlets to a common loading rack.

Designed primarily as a distributing, rather than sales, depot, the plant offers numerous economies in the bulk movement of products. One operator handles incoming and outgoing shipments for all companies represented. A complete check of products is obtained by use of meters on all discharge lines at the loading rack, including a 1¼-inch meter for measuring deliveries to fuel tanks of transport equipment.

Speed is the keynote throughout the plant, for fast unloading of the river boats and for loading the transports. Unloading is effected through a rotary pump driven by a 25 hp. motor to achieve a discharge of 575 gallons per minute.

The pump is located on a floating dock, 15 by 34 feet, which is a temporary arrangement pending a study of water level and ice conditions on the river for the various seasons.

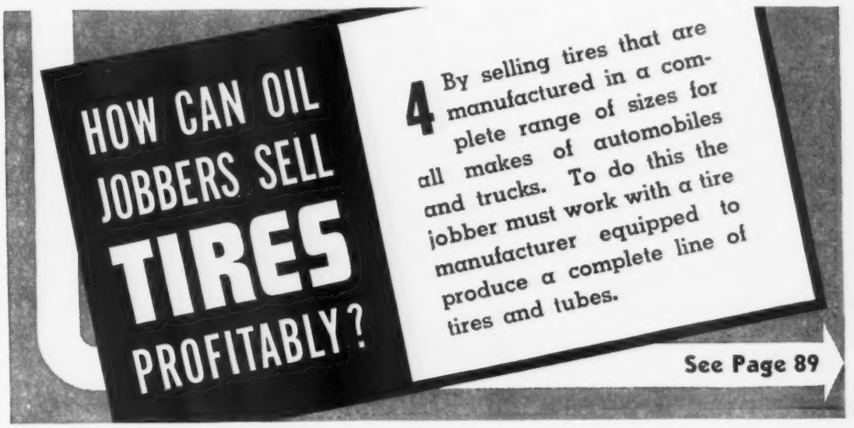
Discharge lines consist of one 8-inch and two 6-inch lines, all 1400 feet long, connecting to a central terminal, where a three-way "common user" valve clears the way for final discharge through individual company lines to storage. The 8-inch line is used for "Q" grade gasoline and the 6-inch for third grade and Ethyl.

Tanks are equipped with 6-inch swing pipes attached inside the tank to the loading rack outlets and 2 feet off tank bottom, to avoid possible water contamination resulting from the barge shipment.

Lines from individual company storage to the common loading rack are 6-inch. Each company has its own loading facilities on this rack, including 4-inch meters on the "Q" gasoline lines and 3-inch on the other two products. A discharge rate of 600 g.p.m. on the "Q" grade and 450 g.p.m. on third grade and ethyl is furnished by a 15 hp. motor-driven pump on the former and a 10 hp. motor-driven pump on the other lines. These pumps are adjacent to the respective company's storage tanks.

A main panel board, installed as a common user facility, has individual remote control switches to operate the pumps for each company.

Although distribution from this plant is now effected entirely through transport truck assemblies, provision has been made for inclusion of a rail spur track in the future.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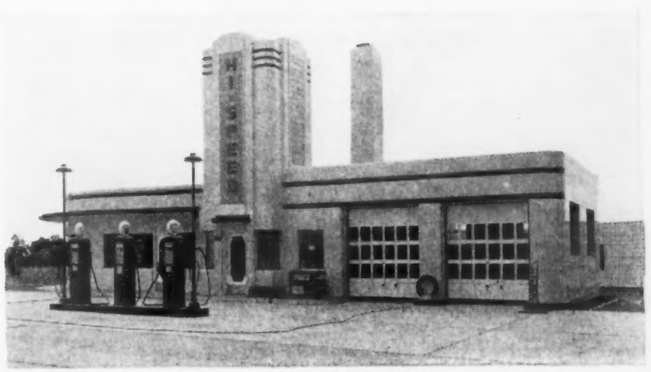

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More Regulation in Offing For Oil's Tank Trucks

THERE will be increasing effort at more detailed regulations of the oil industry's privately owned and privately operated petroleum product trucks this coming year, according to a survey of the legislative horizon by NATIONAL PETROLEUM NEWS.

Congress and the Interstate Commerce Commission, egged on by the railroads and labor unions, will undoubtedly continue to try and put under detailed federal regulation, all trucks of every kind that cross state lines.

State legislatures will be urged to enact more regulatory measures against trucks. Eight such legislatures meet this winter, with special sessions probable in 20 other states.

Regulatory efforts will be chiefly directed to the following according to expectations of truck organizations:

State laws to prohibit all trucks on highways on week-ends and holidays.

More restriction of working hours and conditions for the drivers.

Development of more construction and equipment specifications under the guise of "safety" needs.

National trucking interests, however, have hopes of more success in the following legislation that will be of benefit to truck owners and particularly tank truck owners:

Raising low weight limitations so as to allow larger tanks, with a view of standardizing at a reasonable higher minimum.

Removal of more barriers to trucking across state lines, such as eliminating or reducing the handicaps of ports of entry and special state inspection fees and taxes.

Probably one of the greatest revolutionary regulatory threats before oil marketing is the proposed banning of tank trucks from highways on week-ends and holidays.

Already tank trucks are specifically prohibited in South Dakota and Nebraska by act of their legislatures. Wisconsin and Minnesota have regulations barring trucks generally, with certain exceptions, from their highways on week-ends and holidays during the peak traffic season. In Texas the Railroad Commission bans public carriers except those carrying farm produce and other perishables who, however, have to get special permits.

The National Highway Users Conference, at the close of the last legislative period, noted there seemed to be sentiment developing for week-end restrictions in a number of other states where holiday traffic is heaviest and particularly in California, Illinois and Michigan. These states will not have regular session in 1940 but there probably will be a special session in Illinois. Regular legislative sessions are scheduled for Kentucky, Mississippi and Rhode Island beginning Jan. 2; New York starting Jan. 3; New Jersey and South Carolina Jan. 9, Virginia Jan. 10 and Louisiana May 30. Week-end trucking legislation may be proposed in any of these.

This type of legislation received an official "pat on the back" by Interior Secretary Ickes in an address before the American Automobile Association's convention in Washington last month. The association, however, did not act in Ickes' recommendations.

The revolutionary effect of this banning of tank trucks from servicing stations on Saturday and Sunday or on holidays, is that many stations, where the week-end gallonage is heaviest, will have to be equipped with larger tanks. This means not only more investment for the oil company but more capital is required by the dealer, a real handicap particularly on those who persist in living on a hand-to-mouth basis.

Where larger tanks are required it means, undoubtedly, that the oil companies will go the whole way to increasing their operating efficiency by installing tankage for full truck dumps, thus turning more of the better stations into bulk storage stations, into whose tanks the big truck transports undoubtedly would deliver. Such week-end banning of tank trucks will speed the day of by-passing old time railroad bulk plants, by direct deliveries from refineries and pipeline and marine terminals.

If the oil company trucks have to stand idle in their garages at least two days (Saturday and Sunday) out of every week, that means less gallons delivered per dollar invested in each truck and its fixed overhead, unless a longer daily truck schedule can be worked out. That also might mean extra expense because of night work or longer hours. Coming up on this side of the problem are the wage and hour regulations, and "safety" regulations, as well as the possibility of more stringent rules by the Interstate Commerce Commission, governing trucks' operations.

All this, it is pointed out, probably will tend to throw the operating efficiency advantage more and more to the larger stations and make less economical the small stations and other small retail outlets.

From the standpoint of federal regulations, trucks operations generally, and those of petroleum's tank trucks in particular, will be definitely affected by a number of proposals now pending before the Interstate Commerce Commission. Operators' working hours will also probably be specified, either by the Interstate Commerce Commission or by the Wage-Hour Division of the Labor Department.

The Interstate Commerce Commission already has promulgated "safety" regulations which cover hours of service, standards of equipment and various other phases of operations, for "for-hire" carriers, both common and contract, under the Motor Carrier Act. An ICC examiner has recommended that these same regulations, with only a few exceptions, be applied to private carriers—which would include all oil company transport trucks which cross state lines.

The so-called "safety" regulations of the ICC are divided into seven parts. They cover qualifications of drivers, rules for driving, define vehicle parts and accessories necessary for safe operation, reporting of accidents, hours of service, rules for handling of dangerous articles, (not yet promulgated), and inspection and maintenance of equipment.

Should the ICC examiner's proposal to make them applicable to private trucks be accepted, it would mean that the oil marketer owning a few trucks, if they crossed state lines, would have to hire his drivers under regulations of the ICC. He would have to follow certain driving rules set down by this body. He would have to equip his trucks with all sorts of green and red lights and other equipment, the same as the for-hire carriers. He would have to follow the ICC's regulations for hours of service. On top of all this he would have to make out detailed reports for the government, covering details of his trucks' operations.

If private truck operators were declared "motor carriers" under the Mo-

tor Carrier Act, which would be the effect of the examiner's recommendations, as now before that body, many authorities believe the private operators would be made subject to other provisions of this act and of the Interstate Commerce Act. The National Council of Private Motor Truck Owners, which has been fighting the applying of the Motor Carrier Act to private carriers, feels that provisions of the act will be extended to more than the sections which apply to drivers and equipment only.

The council believes the Act appears to give anyone the right to file a complaint against a carrier, necessitating a hearing and, possibly, a rehearing, to which the private operator would have to bring his books, records, accounts, documents, contracts, papers and correspondence.

IN short, once the Interstate Commerce Commission stepped in, the private truck owner whose trucks crossed state lines would be subject to about all the rules to which a for-hire carrier must conform, except possibly the filing of contracts and tariffs.

The private truck owners point out that, while only about 8 per cent of the country's 2,800,000 privately-owned trucks actually operate in interstate commerce and would be directly affected by the ICC regulations, the tendency would be toward similar state regulations for the other 92 per cent.

Another phase of federal regulation as yet undetermined, but affecting tank truckers—both private and for-hire—is the proposed rules for transportation by truck of dangerous articles, inflammables, explosives, etc.

At the present time the "inflammables" rules for trucking are applicable only to common carrier trucks, as promulgated under the Transportation of Explosives Act. The ICC has "in the works", however, a set of rules for application to both common and contract carriers under the Motor Carrier Act, and it is this set of rules, which, when promulgated, would be made applicable also to every oil company-owned tank truck in the country that crosses a state line.

Under these regulations, the ICC would be empowered to tell the tank truckers, as well as the truck operating oil company, just how heavy the steel in truck tanks should be; into how many compartments the tanks should be divided; how the tanks should be mounted; how marked; how much should be allowed for expansion and shrinkage, and a hundred other technical "hows" concerning their operations. These rules would likewise be applicable to the hauler of oil products in drums or other packages.

Still another phase of federal regulation in the offing—and one which has the approval of at least a portion of the trucking industry—is the regu-

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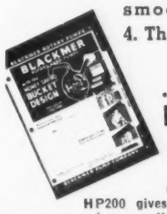

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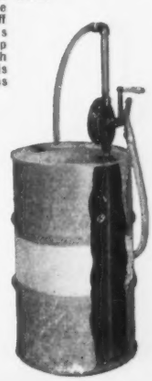

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lation of truck sizes and weights. Only last month the ICC made its first report on its investigation into the "need" for such regulation.

The Motor Carrier Act provides for such an investigation, and for a report to Congress as to the "need", after which, supposedly, "if the need be found", ICC will promulgate federal restrictions aimed at wiping out the many and conflicting state size and weight standards which have seriously hampered the flow of interstate commerce by truck.

This movement may be hastened, in fact, by the interest of the War Department in securing uniformity in truck sizes and weights over the country, so that mobilization of the nation's truck resources could be done more effectively in case of any emergency. The oil industry's tank trucks would have a key place in any such mobilization plans and uniform weights and sizes would aid the War Department in planning the number of tank trucks needed for field service. Army officials are working with the American Trucking Associations, Inc., representing all trucking interests, to the end of promulgating federal regulations governing sizes and weights of trucks on the highways.

Regulations by the Interstate Commerce Commission on the subject of truck weights cannot be expected for more than a year—possibly longer. Meanwhile, the trend in state legislatures has made a definite swing to uniformity on size and weight regulation. With few exceptions, the laws enacted during the 1939 sessions have been designed, for the most part, to reduce the confusion caused by wide divergence of requirements.

With one or two exceptions, new laws have brought the maximum weight limit to 40,000 pounds, and the maximum width to the 96 inches recommended by the American Association of State Highway officials. All this has come about despite open opposition of the railroads.

But while size and weight limitations for trucks generally have been liberalized in many states, there has been a noticeable trend, particularly in the Northwest, to legislate against tank trucks specifically. In Minnesota last year the state board of railway commissioners ruled that tank trucks on the state's highways must not be loaded with more than 2000 gallons, and must conform to other regulations

As even more stringent set of regulations was promulgated in South Dakota, under a law passed at the last session of its legislature. Under these rules all tank trucks must have state permits, whether they operate interstate or intrastate. Tank trucks are barred from the highways on weekends and holidays; drivers must keep logs; thickness and construction of tanks are specified; truck markings are specified, and the load limit is set at 1500 gallons, except by special permission of the state Public Utilities Commission.

COMMENTING on these laws aimed at the petroleum trucker, the National Highway Users Conference reports in its "Legislative Trial Balance" covering state legislation in 1939:

"Another proposed type of restrictive legislation that has swept the country like a plague is the limitation on the quantity of gasoline or petroleum that may be carried in a tank-truck. A year ago this had never been heard of. This year, bills limiting the quantities anywhere from 600 to 3500 gallons were introduced in 19 states.

"South Dakota has enacted legislation limiting such transportation to 1500 gallons, though permits for excess quantities may be issued . . . Similar bills have died in Arizona, Arkansas, Colorado, Connecticut, Florida, Georgia, Illinois, Iowa, Kansas, Michigan, Missouri, Nebraska, Nevada, North Carolina, North Dakota and Washington.

Also on the favorable side of the ledger for the oil companies, the state trade barriers, which have so long handicapped commerce by trucking between many states, are being let down and all indications are that the trend in this direction will continue. Oklahoma repealed its port of entry law and no new port of entry laws were passed at the last sessions of the state legislatures. Eight states adopted new reciprocity laws, making it simpler for trucks from other states to cross their borders.

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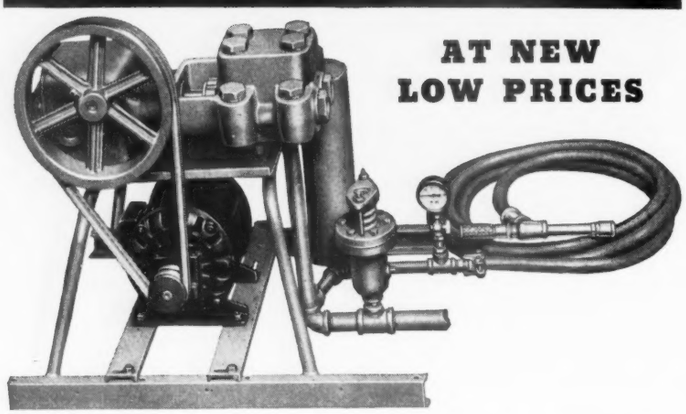

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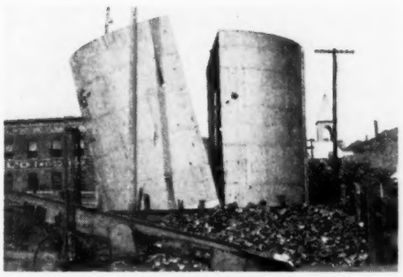

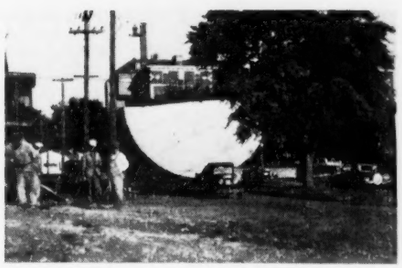

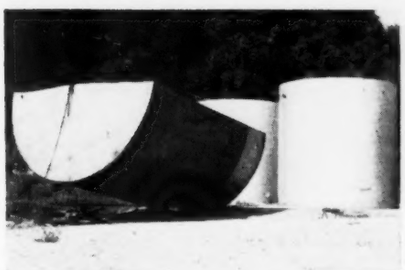

Sawing a woman in two has always been a popular trick with the prestidigitators. An oil marketing company in Iowa found cutting a 216,000-gallon tank in half was a good trick too, to avoid overhead high tension wires, when it wanted to move the tank to a new location.

The tank, 32 feet in diameter and 36 feet high, was erected in 1934 in the business district of Burlington, Ia., by the Stang Engineering Service Co., burner oil distributors. The company built a river terminal later and wanted to move the tank to the new location.

"We found it was too large to move in one piece," said Ray E. Stang, "due to overhead wires, including high tension lines. Being unable to obtain anyone locally to move it, we finally borrowed some house moving trucks, reinforced the tank with boiler flues and cut in half vertically and moved it in two parts."

The tank had to be moved by water because, except for the business section in Burlington, the streets were too narrow to move it the entire distance by road. Each half was lowered on a 40-foot cradle of 12-inch timbers, which rested on the house moving trucks, and pulled to the river by one of the oil company's trucks. There it was loaded on a barge and pushed upstream by a small river boat. At the terminal site, the half tank was unloaded on a ramp and moved to the new site. The two halves were welded together, the tank painted and it was ready to be filled with oil.

Photo 1 shows the first half of the tank being lowered with gin poles to the cradle; 2—the half tank being pulled down the street to the river; 3—being pushed up the river on a barge; 4—the first half, at the new site, being raised by block and tackle attached to the top of another tank; 5—the two halves joined and the tank painted, ready for a fill of oil.

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Markets

Mid-Continent

TULSA, Dec. 9. — Prices reported for Grade 26-70 natural gasoline were down 0.25 cent the past week. Quotations of 3.50 cents, Breckenridge, and 3.75 cents, Group 3, brought in a few straggling orders, but for the most part the lower prices did little to stimulate movement, manufacturers said.

Regarding refined gasoline, refiners said they were "marking time and waiting definite reaction from buyers to below-the-market offerings." These offerings were reported as low as 4.125 cents, Group 3, 70-72 octane gasoline from Texas. At the same time, sales of several cars of 70-72 octane were reported by an Oklahoma refiner at 5.25 cents. Other quotations reported by Oklahoma refiners for this grade ranged from 5 to 5.50 cents.

Because he was sold up, one Mid-Continent refiner said he had turned down several barge export inquiries for bright stock. Inquiries totaled about 30,000 barrels, he said. Two other refiners said they were "pretty well sold up" as result of recent export orders.

Mild weather in the north and middle west was said to have delayed the placement of orders for light fuel oils in the Mid-Continent. Quotations were unchanged, according to reports.

Gulf

NEW YORK, Dec. 9. — No changes in quotations for refined products at the Gulf were reported in the week ended Dec. 9. Reports from refiners here and from the southwest indicated there was little activity during the early part of the week. Late in the week two refiners said there was new interest in the market, and reported "new inquiries for crude, gas oil and kerosine", and "inquiries from French and English buyers for motor fuel and leaded aviation gasoline". No cargo sales were reported.

Six or eight British and French tankers were said to have docked at Corpus Christi last week, and the Houston ship channel was said to be "full of newly-arrived tankers". "It looks as though there will be more material loaded in December than in November," one refiner commented.

Eastern

NEW YORK, Dec. 9. — Advances of 0.25 cent in quotations for light fuel oils, Diesel oil at shore plants, and 28-34 gravity gas oil, were reported by several Philadelphia and Baltimore suppliers the past week. Lows of price ranges for light fuel oils, however, were unchanged when at least one supplier said he had made no changes in his quotations. Prices for Nos. 2 and 3 fuels ranged from 4.50 to 4.75 cents, and for No. 4 from 4.25 to 4.75 cents at Philadelphia and Baltimore at the end of the week.

Quotations for gasoline generally were reported unchanged by Atlantic Coast suppliers. One exception was when a supplier reported withdrawing his quotations for 65 octane at all points and said he was now offering 72-74 octane at Norfolk for 7 cents. This effected an advance of 0.25 cent to 6.75 cents on the low of the price range for 65 octane gasoline at Wilmington, and reduced the low of the price range for 72-74 octane at Norfolk 0.75 ient to 7 cents. Gasoline was in "only a fair position", with high tanker rates from the Gulf largely responsible for high replacement costs, some suppliers said.

Mid-Western

CHICAGO, Dec. 9. — Gasoline quotations reported by Mid-western and tank car marketers were down 0.125 to 0.625 cent the past week. Quotations reported at the close of the week were 3.625 to 4.625 cents for 62 octane and below, 4.125 to 4.625 cents for 63-66 octane, 4 to 5 cents for 67-69 octane, and 4.125 to 5.25 cents for 70-72 octane.

Open spot sales of 24 cars of 70 72 octane gasoline at prices ranging from 4.125 to 4.625 cents were reported by tank car marketers. Mild weather throughout the Middle West resulted in good movement of gasoline against contracts, sellers said.

Kerosine was featureless, marketers said. Quotations ranged from 3.50 to 4 cents for 41-43 w.w. kerosine, and from 3.625 to 4.25 cents for 42-44 w.w. kerosine.

A tank car marketer reported spot sales of two cars of range oil at 3.50 cents. Other quotations for this product ranged from 3.375 to 3.875 cents. No changes in quotations for other light fuels were reported during the week.

Industrial fuel movement generally was reported good throughout the week. Prices reported for No. 6 fuel, f.o.b. Illinois refinery district, ranged from $0.75 to $0.85 per barrel. Quotations, f.o.b. Group 3, were $0.45 for No. 6 fuel and $0.65 for No. 5 fuel.

Pennsylvania

CLEVELAND, Dec. 9. — What some refiners described as "virtually a flood of inquiries for lubes and wax" were received in western Pennsylvania from export buyers the past week. Prices of these products were unchanged as reported by most refiners. U. S. Motor gasoline, kerosine and fuel oil were quoted 0.125 to 0.25 cent lower in the lower field. Upper field prices were reported unchanged.

Considerable export lubes and wax which had been held at the eastern seaboard have moved out, making way for new export purchases in the field, refiners said.

"Inventories of bright stock had begun to increase in the field," one refiner commented. "However," he added, "some of the larger buyers appear to have taken up all the bright stock available below 30 cents." Quotations reported for 25 pour test stock ranged from 25 to 33 cents throughout the week.

Neutral oils were said to be exceptionally scarce. Several refiners said they were sold up for from 30 to 90 days.

Lower field refiners said demand for light products was unusually slow. Low quotations reported for U. S. Motor gasoline and fuel oil were down 0.125 cent at 4.625 cents and 3.875 cents for the two products, respectively, with kerosine off 0.25 cent at 4.50 cents for 45 water white.

California

LOS ANGELES, Dec. 9. — Except for one report that kerosine-distillate had dropped to a low of $1.10 a barrel, or 2.625 cents a gallon, due to continued warm weather, quotations for other products were said to be unchanged in West Coast markets the past week.

Several "wild deals" were reported by one supplier as having been made on leaded gasolines, and an increased amount of leaded gasoline products was being offered at independent service stations at prices ranging from 2 to 4 cents below previously posted prices for "Q" grade gasoline.

Third-grade gasoline was "very weak, with an unlimited quantity available at independent racks for 6 cents a gallon," according to one trader.

Bids by California oil men to supply Japan with seven full cargoes, 12,000 tons each, of 21-38 gravity crude oil, will be opened Dec. 20 at Tokyo, it was learned here. It was understood that these cargoes will be lifted from April through July.

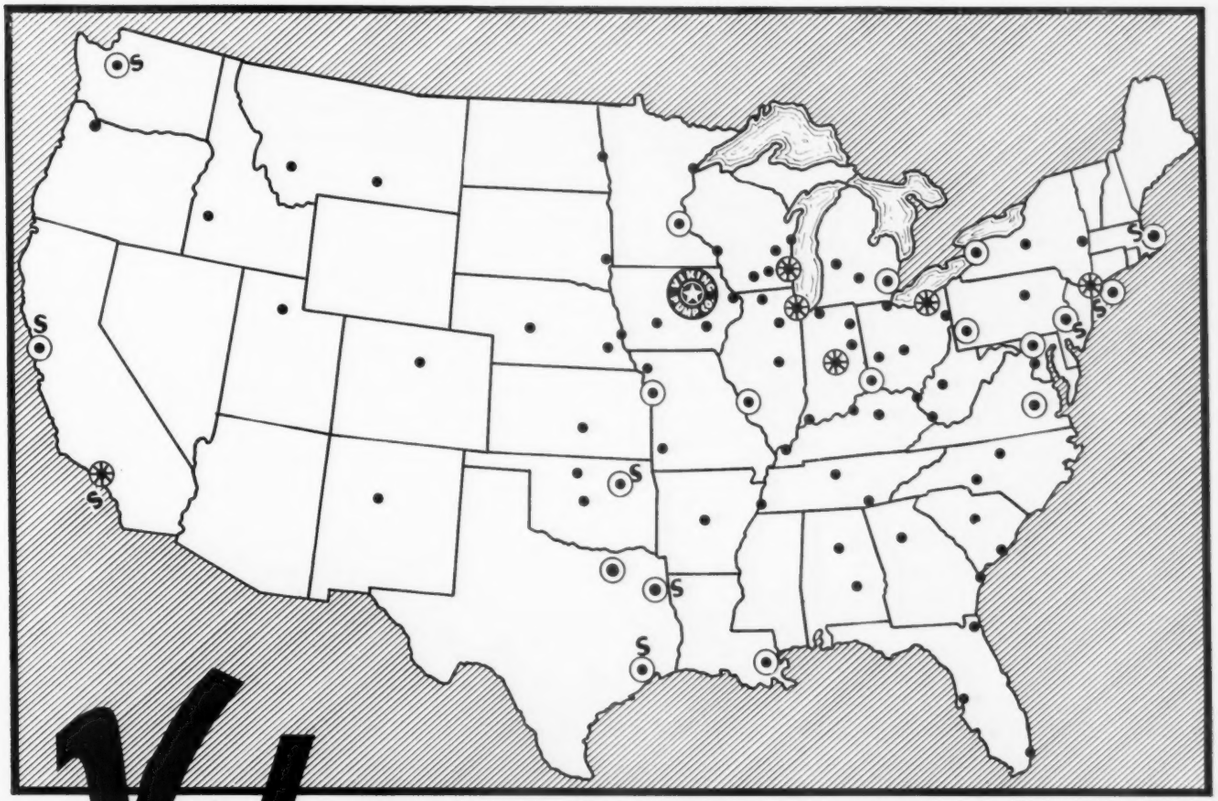
European inquiries for Diesel oil, both cargo and bunker lots, were said to have dropped 75 per cent from the number received in September and October.

N.P.N. Gasoline Index

	Dealer T. w.	Tank Car
	Cents per Gallon	
Dec. 11	9.60	6.21
Month ago	9.64	6.24
Year ago	9.62	5.48

Dealer index is an average of "undivided" dealer prices, ex-tax, in 50 cities.

Tank car index is a weighted average of 9 wholesale markets for regular-grade gasoline.



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The Viking Pump Company, world's largest rotary pump manufacturer, is strategically located in the very heart of the nation. Its vast organization of sales and service offices cover the entire country—touching every border—every sea coast. Each is qualified to aid you in the fulfillment of every pumping need . . . the solution of every pumping problem. It has always been the policy of the Viking Pump Company to build rotary pumps the very finest money can buy—to offer service second to none.

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Viking PUMP COMPANY
CEDAR FALLS, IOWA

REFINERY TANK CAR MARKETS

All prices on this page are publisher's opinion of open market quotations or sales, for spot shipment (10 to 15 days) unless otherwise stated. Prices in cents per gallon, except heavy fuel oils in dollars per barrel of 42 gallons, wax and petrolatums in cents per pound in barrels, tank car lots, FOB refineries in districts designated, except where otherwise noted. Inter-refinery and export prices not included unless so stated in the respective markets. Federal, state or municipal taxes not included. Prices quoted apply on products made from legally produced crude. Unless otherwise noted, gasoline octane ratings are determined by C.F.R. Motor method, A.S.T.M. D-357-33T; and lubricating oil specifications determined according to A.S.T.M. methods, unless otherwise noted

Gasoline

Prices Effective	Dec. 11	Dec. 4
OKLAHOMA Refiners' Quotations & Sales Prices		
U. S. Motor: (Oct. L-3)		
62 oct. & below	4.25 – 4.625	4.25 – 4.625
63-66 oct.	4.50 – 4.875	4.50 – 4.875
67-69 oct.	4.625 – 5.25	4.625 – 5.25
70-72 oct.	5.00 – 5.50	5.00 – 5.50
60-62, 400 e.p.	(h) 4.375–4.50	(h) 4.375– 4.50
WESTERN PENNA. REFINERS' QUOTATIONS		
Bradford-Warren:		
Motor gasoline:		
U.S. Motor (58-62°)	(h)5.00	(h)5.00
Min. 65 oct.	6.75	6.75
"Q" gasoline	(h)6.75	(h)6.75
73-74 oct. (L-3)	(e)7.00	(e)7.00
75-76 oct. (L-3)	(e)7.30	(e)7.30
Other districts:		
Motor gasoline:		
U. S. Motor (58-62° gravity):	4.625– 5.00	4.625– 5.00
"Q" gasoline	5.75 – 6.25	6.00 – 6.25
CENTRAL MICHIGAN (a)		
Str.-Run Gasoline	(c) 4.25 –4.75	(c) 4.25 –4.75
U. S. Motor: (Oct. L-3)		
67-69 oct.	(h)6.25	(h)6.25
70-72 oct.	(i)	7.00
72-74 oct.	(h)7.00	

Prices Effective	Dec. 11	Dec. 4
CALIFORNIA		
U. S. Motor:		
54-58 gravity, for in-state shipment	6.50 – 9.25	6.50 – 9.25
54-58 gravity, for out-side state shipment	6.50 – 9.00	6.50 – 9.00
58-61 gravity, 375-400 e.p., 65 oct. & above	7.75 – 9.75	7.75 – 9.75
N. TEX. REFINERS' QUOTATIONS (b)		
U. S. Motor: (Oct. L-3)		
62 oct. & below	4.25 – 4.75	4.25 – 4.75
63-66 oct.	4.50 – 5.00	4.50 – 5.00
67-69 oct.	4.75 – 5.25	4.75 – 5.25
70-72 oct.	5.00 – 5.625	5.00 – 5.625
60-62, 400 e.p.	(h) 4.25 –4.375	(h) 4.25 –4.375
KANSAS (For Kansas destinations only)		
U. S. Motor: (Oct. L-3)		
62 oct. & below	(e)4.625	(e)4.75
67-69 oct.	(e)4.875	(e)5.00
70-72 oct.	(e)5.375	(e)5.50
W. TEX. REFINERS' QUOTATIONS (b)		
U. S. Motor: (Oct. L-3)		
62 oct. & below	(h) 4.25 –4.50	(h) 4.25 –4.50
63-66 oct.	(e) 4.75 –5.00	(e)4.75
67-69 oct.	(h) 4.75 –5.00	(h) 4.75 –5.00
70-72 oct.	(h) 5.00–5.125	(h) 5.00 –5.25

Prices Effective	Dec. 11	Dec. 4
CENT. W. TEX. REFINERS' QUOTATIONS (Prices to truck transports)		
U. S. Motor: (Oct. L-3)		
62 oct. & below	(e)4.375	(e)4.50
63-66 octane	(e)5.00	(e)5.125
66-70 octane	(i)	(i)
E. TEX. REFINERS' QUOTATIONS		
U. S. Motor: (Oct. L-3)		
70-72 oct.	(e)5.00	(e)5.00
60-62, 400 e.p.	(e)4.75	(e)4.75
N. LA. REFINERS' QUOTATIONS (For shipment to La. & Ark.)		
U. S. Motor: (Oct. L-3)		
62 oct. & below	(h) 4.75 –5.00	(h) 4.75 –5.00
63-66 oct	(e) 5.00 –5.25	(e) 5.00 –5.25
70-72 oct. leaded	(h) 5.50 –5.75	(h) 5.50 –5.75
ARKANSAS REFINER'S QUOTATIONS (F.o.b. Ark. plant of one refiner, for shipment to Ark. & La.)		
U. S. Motor: (Oct. L-3)		
62 oct. & below	4.50	4.75
67-69 oct.	5.00	5.25
70-72 oct.	5.25	5.50
OHIO (S. O. Ohio quotations for statewide delivery and subject to exceptions for local price disturbances)		
70-72 oct.	7.50	7.625

(Continued on next page)

(a) Prices FOB. Central Michigan refinery group basis, for shipment within Mich. Shipments may originate at plants outside Central group. (b) For shipment to Texas and New Mexico destinations; Group 3 prices quoted for northern shipment. (c) Excluding Detroit shipment. (e) One refiner quoting. (f) Two suppliers quoting. (g) To re-sellers holding licenses. (h) Two refiners quoting. (i) No quotations reported.

MID-WESTERN REFINERS' TANK CAR QUOTATIONS

Prices in this Midwestern Refiners' Tank Car Market table are gathered from refiners from their offices located in Chicago and the surrounding territory. While the prices are quoted on a Group 3 (Oklahoma) freight rate basis, this is in accordance with the custom of the oil industry which uses Group 3 as a price basis for the ease of comparing prices even when the material originates in another refining district. Generally when prices are quoted in this Chicago market, the origin of the material is not known at the time the quotation is given, oftentimes even with the quoting refiners who have refineries in more than one refining district. All other gasoline prices are given by and for the particular refining district where the material is made and from which it is shipped.

Gasoline

Prices Effective	Dec. 11	Dec. 4
U. S. Motor: (Oct. L-3)		
62 oct. & below	4.25 – 4.625	3.625– 4.75
63-66 oct.	(b)4.50	4.125– 4.75
67-69 oct.	4.75 – 5.25	4.50 – 5.125
70-72 oct.	5.00 – 5.50	4.625– 5.375

Kerosine

41-43 grav. w.w.	3.625– 4.25	3.50 – 4.00
42-44 grav. w.w.	3.75 – 4.625	3.625– 4.25

Fuel and Gas Oils

Prices Effective	Dec. 11	Dec. 4
No. 1 p.w.	3.375–3.75	3.375– 3.75
No. 1 straw	(b)3.25	3.25 – 3.375
No. 2 straw	3.125–3.25	3.125– 3.25
No. 3	3.125	3.00 – 3.125
No. 5	(b)$0.65	(e)$0.65
No. 6	$0.45	$0.45
Range oil	3.50 – 3.875	3.375– 3.875

Naphtha and Solvent

Prices Effective	Dec. 11	Dec. 4
(FOB Group 3 as quoted by two Chicago sellers)		
Stoddard solvent	6.375	6.375
Cleaners' naphtha	6.875	6.875
V. M. & P. naphtha	6.875	6.875
Mineral spirits	5.875	5.875
Rubber solvent	6.875	6.875
Lacquer diluent	7.875	7.875

Daily range of gasoline prices as reported in PLATT'S OILGRAM (Week Ended Dec. 8, 1939)

	Dec. 4	Dec. 5	Dec. 6	Dec. 7	Dec. 8
U. S. Motor, (Octane Number determined according to L-3 Method in Okla., Texas and Mid-Western Districts):					
62 octane and below:					
Oklahoma	4.25 – 4.625	4.25 – 4.625	4.25 – 4.625	4.25 – 4.625	4.25 – 4.625
(a) North Texas	4.25 – 4.75	4.25 – 4.75	4.25 – 4.75	4.25 – 4.75	4.25 – 4.75
West Texas	(c) 4.25 –4.50	(c) 4.25 –4.50	(c) 4.25 –4.50	(c) 4.25 –4.50	(c) 4.25 –4.50
Mid-Western (Group 3 basis)	3.625– 4.75	3.50 – 4.75	3.50 – 4.75	3.625– 4.75	3.625– 4.625
63-66 octane:					
Oklahoma	4.50 – 4.875	4.50 – 4.875	4.50 – 4.875	4.50 – 4.875	4.50 – 4.875
(a) North Texas	4.50 – 5.00	4.50 – 5.00	4.50 – 5.00	4.50 – 5.00	4.50 – 5.00
West Texas	(b)4.75	(b)4.75	(b)4.75	(b)4.75	(b) 4.75 –5.00
Mid-Western (Group 3 basis)	4.125– 4.75	4.00 – 4.75	4.00 – 4.75	4.125– 4.75	4.125– 4.625
67-69 octane:					
Oklahoma	4.625– 5.25	4.625– 5.25	4.625– 5.25	4.625– 5.25	4.625– 5.25
(a) North Texas	4.75 – 5.25	4.75 – 5.25	4.75 – 5.25	4.75 – 5.25	4.75 – 5.25
West Texas	(c) 4.75 –5.00	(c) 4.75 –5.00	(c) 4.75 –5.00	(c) 4.75 –5.00	(c) 4.75 –5.00
Mid-Western (Group 3 basis)	4.50 – 5.125	4.25 – 5.125	4.25 – 5.125	4.25 – 5.125	4.00 – 5.00
70-72 octane:					
Oklahoma	5.00 – 5.50	5.00 – 5.50	5.00 – 5.50	5.00 – 5.50	5.00 – 5.50
(a) North Texas	5.00 – 5.625	5.00 – 5.625	5.00 – 5.625	5.00 – 5.625	5.00 – 5.625
West Texas	(c) 5.00 –5.25	(c) 5.00 –5.25	(c) 5.00 –5.25	(c) 5.00 –5.25	(c) 5.00 –5.125
East Texas	(b)5.00	(b)5.00	(b)5.00	(b)5.00	(b)5.00
Mid-Western (Group 3 basis)	4.75 – 5.375	4.50 – 5.375	4.50 – 5.375	4.25 – 5.375	4.125– 5.25
Motor Gasoline, 60-64 octane:					
New York harbor	(f)6.70	(f)6.70	(f)6.70	(f)6.70	(f)6.70
Philadelphia district	6.50 – 6.75	6.50 – 6.75	6.50 – 6.75	6.50 – 6.75	6.50 – 6.75
Baltimore district	6.25 – 6.75	6.25 – 6.75	6.25 – 6.75	6.25 – 6.75	6.25 – 6.75
Motor Gasoline, 65 octane & above:					
New York harbor	6.75 – 7.30	6.75 – 7.30	6.75 – 7.30	6.75 – 7.30	6.75 – 7.30
Philadelphia district	6.50 – 6.75	6.50 – 6.75	6.50 – 6.75	6.50 – 6.75	6.50 – 6.75
Baltimore district	6.50 – 7.00	6.50 – 7.00	6.50 – 7.00	6.50 – 7.00	6.50 – 7.00
U. S. Motor, 58-62°:					
Bradford-Warren (Western Penna.)	(e)5.00	(e)5.00	(e)5.00	(e)5.00	(e)5.00
Other districts (Western Penna.)	4.625– 5.00	4.625– 5.00	4.625– 5.00	4.625– 5.00	4.625– 5.00
Motor Gasoline, Min. 65 octane:					
Bradford-Warren (Western Penna.)	6.75	6.75	6.75	6.75	6.75
"Q" Gasoline:					
Bradford-Warren (Western Penna.)	(e)6.75	(e)6.75	(e)6.75	(e)6.75	(e)6.75
Other Districts (Western Penna.)	6.00 – 6.25	6.00 – 6.25	6.00 – 6.25	6.00 – 6.25	6.00 – 6.25
73-74 Octane: (L-3)					
Bradford-Warren (Western Penna.)	(b)7.00	(b)7.00	(b)7.00	(b)7.00	(b)7.00
75-76 Octane: (L-3)					
Bradford-Warren (Western Penna.)	(b)7.30	(b)7.30	(b)7.30	(b)7.30	(b)7.30

(a) For shipment to Texas and New Mexico destinations: Group 3 prices are quoted on northern shipment. (b) One refiner quoting. (c) Two refiners quoting. (d) No quotations reported. (e) Two suppliers quoting. (f) One supplier quoting.

"SCREWDRIVER"—his "traffic boners" are the cause of 25% of all Stop-and-Go, traffic authorities say. The Shell Share-the-Road Club is out to teach him better driving manners!

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For further information concerning the details of what Shell has to offer, we suggest that you contact a Shell representative in the near future.

SHELL OIL COMPANY
INCORPORATED

REFINERY TANK CAR MARKETS

All prices on this page are publisher's opinion of open market quotations or sales, for spot shipment (10 to 15 days). Prices in cents per gallon except heavy fuel oils in dollars per barrel of 42 gallons, tank car lots, FOB refineries in districts designated, except where otherwise noted. Inter-refinery and export prices not included, unless so stated in the respective markets. Federal, state or municipal taxes not included. Prices quoted apply on products made from legally produced crude. Unless otherwise noted, gasoline octane ratings are determined by C.F.R. Motor method, A.S.T.M. D-357-33T; and lubricating oil specifications determined according to A.S.T.M. methods, unless otherwise noted.

Natural Gasoline Prices

(Prices to blenders on freight basis shown below. Shipments may originate in any Mid-Continent manufacturing district.)

Prices Effective	Dec. 11	Dec. 4
FOB GROUP 3		
Grade 26-70	(m) 3.50	(m)4.00
FOB BRECKENRIDGE		
Grade 26-70	(l) 3.25 –3.50	(m)3.75
CALIFORNIA (F.o.b. plants in Los Angeles basin) 75-85, 350-375 e.p. for blending	6.00 – 6.25	6.00 – 6.25

Kerosine

WESTERN PENNA. REFINERS' QUOTATIONS

Bradford-Warren:		
45 grav. w.w.	4.875– 5.00	4.875– 5.125
46 grav. w.w.	(e)5.375	(e)5.375
Other districts:		
45 grav. w.w.	4.50 – 5.00	4.50 – 5.00
46 grav. w.w.	4.625– 5.125	4.625– 5.125
47 grav. w.w.	4.75 – 5.25	4.75 – 5.25
CENTRAL MICHIGAN (a)		
47-49 gravity w.w.	4.80 – 5.05	4.80 – 5.05
OKLAHOMA Refiners' Quotations & Sales Prices		
41-43 grav. w.w.	3.50 – 4.25	3.50 – 4.25
42-44 grav. w.w.	3.625– 4.625	3.625– 4.625
KANSAS (For Kansas destinations only)		
41-43 gravity w.w.	(e)4.125	(e)4.125
42-44 gravity w.w.	(e)4.375	(e)4.375
N. TEX. REFINERS' QUOTATIONS (b)		
41-43 grav. w.w.	(e) 3.75 –4.00	(e)3.75–4.00
E. TEX. REFINERS' QUOTATIONS		
41-43 grav. w.w.	(e)3.50	(e)3.50
N. LA. REFINERS' QUOTATIONS (For shipment to La. and Ark.)		
41-43 grav. w.w.	(e) 3.75 –4.00	(e) 3.75 –4.00
ARK. REFINER'S QUOTATIONS (F.o.b. Ark. plant of one refiner for shipment to Ark. and La.)		
41-43 grav. w.w.	4.00	4.00
CALIFORNIA		
40-43 grav. w.w.	4.50 – 6.00	4.50 – 6.00

Gas *and* Fuel Oils

WESTERN PENNA. REFINERS' QUOTATIONS

Bradford-Warren:		
36-40 gravity	(h) 4.625–4.75	(h) 4.625–4.75
Other districts: (Excluding Pittsburgh District Prices)		
36-40 gravity	3.875– 4.50	3.875– 4.50
CENTRAL MICHIGAN (a)		
P.W. Distillate	4.50 – 5.00	4.50 – 5.00
No. 3 gas oil, Str.	4.25 – 4.50	4.25 – 4.50
U.G.I. gas oil	3.50 – 3.75	3.50 – 3.75
Fuel Oils (Vis. at 100):		
500-700 Vis.	(e)3.25	(e)3.25
300-500 Vis.	(e) 3.25 –3.50	(e) 3.25 –3.50
100-300 Vis.	(e) 3.50 –3.75	(e) 3.50 –3.75
OKLAHOMA		
No. 1 P.W.	3.50 – 3.625	3.50 – 3.625
No. 1 straw	(h) 3.375–3.50	(h) 3.375–3.50
No. 2 straw	(h) 3.25 –3.375	(h) 3.25 –3.375
No. 2 dark	(h)3.25	(h)3.25
U.G.I. gas oil	(h)3.25	(h)3.25
No. 3	(o)3.125	(o)3.125
No. 6	(e)$0.45	(e)$0.45
Range oil	3.625	3.625
KANSAS (For Kans. destinations only).		
No. 1 p.w.	3.875	3.875
10-14 gravity	(n)	(n)
No. 6 fuel	(h) $0.50–$0.60	(h) $0.50–$0.60
N. TEX. REFINERS' QUOTATIONS (b)		
No. 1 P.W.		
E. TEX. REFINERS' QUOTATIONS		
No. 1 p.w.	(e)3.375	(e)3.375
N. LA. REFINERS' QUOTATIONS (For shipment to La. and Ark.)		
10-14 grav'	(e) $0.65–$0.70	(e) $0.65–$0.70
ARK. REFINER'S QUOTATIONS (F.o.b. Ark. plant of one refiner, for shipment to Ark. and La.)		
No. 1	3.75	3.75
No. 2	3.375	3.375
28-32 zero fuel	3.25	3.25
Tractor Fuel	(j)4.50	(j)4.50

Prices Effective	Dec. 11	Dec. 4
CALIFORNIA		
San Joaquin Valley:		
Heavy fuel	$0.55 –$0.75	$0.55 –$0.75
Light fuel	$0.75 –$0.85	$0.75 –$0.85
Diesel fuel (per gal.)	2.75 – 4.00	2.75 – 4.00
Stove dist. (per gal.)	3.00 – 5.00	3.00 – 5.00
Los Angeles:		
Heavy fuel	$0.55 –$0.90	$0.55 –$0.90
Light fuel	$0.65 –$1.00	$0.65 –$1.00
Diesel fuel (per gal.)	2.75 – 4.00	2.75 – 4.00
Stove dist. (per gal.)	2.75 – 5.00	2.75 – 5.00
San Francisco:		
Heavy fuel	$0.95	$0.95
Light fuel	$1.05	$1.05
Diesel fuel (per gal.)	4.50	4.50
Stove dist. (per gal.)	5.50	5.50

Note: All above heavy fuels meet Pacific specification 400; light fuel, spec. 300; Diesel fuels, spec. 200; and stove distillate, spec. 100.

Neutral Oils

WESTERN PENNA. REFINERS' QUOTATIONS

Important Note: Penna. lube prices reported by refiners as for limited sale to regular customers only.

Viscous Neutrals No. 3 col. (*Viscosity at 70° F.*)

200 Vis. (180 at 100°) 420-425 fl.		
0 p.t.	(e)33.50	(e)33.50
10 p.t.	(e)32.50	(e)32.50
15 p.t.	(e)31.50	(e)31.50
25 p.t.	27.00 –34.00	27.00 –32.00
150 Vis. (143 at 100) 400-405 fl.		
0 p.t.	(e)31.50	(e)31.50
10 p.t.	(e)30.50	(e)30.50
15 p.t.	(e)29.50	(e)29.50
25 p.t.	25.00 –29.00	25.00 –29.00

SOUTH TEXAS

Vis. Color		
Pale Oils: (*Vis. at 100°F.*)		
100 No. 1½-2½	5.75 – 6.00	5.75 – 6.00
200 No. 2-3	7.50 – 7.75	7.50 – 7.75
300 No. 2-3	8.00 – 8.25	8.00 – 8.25
500 No. 2½-3½	9.00 – 9.25	9.00 – 9.25
750 No. 3-4	9.50 – 9.75	9.50 – 9.75
1200 No. 3-4	9.875–10.50	9.875–10.50
2000 No. 4	10.00 –10.75	10.00 –10.75
Red Oils:		
200 No. 5-6	7.50 – 7.75	7.50 – 7.75
300 No. 5-6	8.00 – 8.25	8.00 – 8.25
500 No. 5-6	9.00 – 9.25	9.00 – 9.25
750 No. 5-6	9.50 – 9.75	9.50 – 9.75
1200 No. 5-6	9.875–10.50	9.875–10.50
2000 No. 5-6	10.00 –10.75	10.00 –10.75

Note: Red oil prices cover oils with green cast; blue cast red oils are slightly lower in some cases.

MID-CONTINENT (Vis. at 100° F.; F.o.b. Tulsa)

Pale Oils: **(0 to 10 P.P.)**

Vis. Color		
60-85—No. 2	6.50 – 7.50	6.50 – 7.50
86-110—No. 2	6.75 – 8.00	6.75 – 8.00
150—No 3	12.25 –13.75	12.25 –13.75
180—No. 3	13.00 –14.00	13.00 –14.00
200—No. 3	13.50 –14.50	13.50 –14.50
250—No. 3	14.50 –16.00	14.50 –16.00
280—No. 3	15.50 –17.25	15.50 –17.25
300—No. 3	17.50 –17.75	17.50 –17.75
Red Oils:		
180—No. 5	(e)13.50	(e)13.50
200—No. 5	13.00 –14.00	13.00 –14.00
280—No. 5	14.75 –16.00	14.75 –16.00
300—No. 5	(h) 16.25–16.75	(h) 16.25–16.75

Note: Viscous Neutrals, 15-25 p.p. generally are quoted 0.5c under 0-10 p.p. oils. Non-viscous oils, 15-25 p.p., generally are quoted 0.25c under 0-10 p.p. oils.

CHICAGO (Vis. at 100° F.)

(e) Pale Oils 0 to 10 p.p.

Vis. Color		
60-85—No. 2	8.25	8.25
86-110—No. 2	8.50	8.50
150—No. 3	12.75	12.75
180—No. 3	14.00	14.00
200—No. 3	14.50	14.50
250—No. 3	15.50	15.50

Prices Effective	Dec. 11	Dec. 4
CHICAGO (Continued)		
(e) Red Oils:		
180—No. 5	13.50	13.50
200—No. 5	14.00	14.00
250—No. 5	14.50	14.50
280—No. 5	15.50	15.50
300—No. 5	17.25	17.25

Note: Viscous oils, 15 to 30 p.p. are quoted 0.5c lower; 60-85 and 86-110 No. 2 non-viscous oils, 15 to 30 p.p., 0.25c lower. To obtain delivered prices in Chicago, add 0.25c per gal.

Cylinder Stocks

MID-CONTINENT (F.o.b. Tulsa)

Bright Stocks:		
190-200 Vis. at 210° D.	(e)27.00	(e)27.00
150-160 Vis. at 210° D:		
0 to 10 p.p.	23.00 –24.00	23.00 –24.00
10 to 25 p.p.	23.00 –23.50	23.00 –23.50
25 to 40 p.p.	22.50 –23.00	22.50 –23.00
150-160 vis. at 210° E.	21.00 –23.00	21.00 –23.00
120 Vis. at 210° D:		
0 to 10 p.p.	21.75 –23.00	21.75 –23.00
25 to 40 p.p.	(e)21.625	(e)21.625
600 S.R. Dark Green	(e)8.00	(e)8.00
600 S.R. Olive Green	9.00	9.00
631 S.R.	(e)20.00	(e)20.00
Black Oil	(h) 4.00 –5.50	(h) 4.00 –5.50

(e) CHICAGO (Viscosity at 210°)

Unfiltered Steam Refined:		
140	10.00	10.00
160	11.00	11.00
200	12.00	12.00
Bright stocks, 160 vis. at 210. No. 8 color:		
0 to 10 p.p.	24.75	24.75
15 to 25 p.p.	23.75	23.75
30 to 40 p.p.	23.25	23.25
E filtered Cyl. Stock	14.50	14.50

Note: To obtain prices delivered in Chicago, add 0.25c per gal.

WESTERN PENNA. REFINERS' QUOTATIONS

Important Note: Penna. lube prices reported by refiners as for limited sale to regular customers only.

600 S.R. filterable	15.50 –18.00	15.50 –18.00
650 S.R.	17.00 –20.00	17.00 –20.00
600 fl.	17.50 –21.00	17.50 –21.00
630 fl.	21.00 –24.00	21.00 –24.00
Brt. stk, 145-155 vis. at 210°, 540-550 fl., No. 8 col.		
10 p.t.	(h) 31.00–36.00	(h) 31.00–36.00
15 p.t.	(h) 30.00–35.00	(h) 30.00–35.00
25 p.t.	25.00 –33.00	25.00 –33.00

Petrolatums

WESTERN PENNA. (Bbls., carloads; tank cars, 0.5c per lb. less. One refiner reports he equalizes freight with nearest refinery to destination).

Snow White	7.625– 8.25	7.625– 8.25
Lily White	6.625– 7.25	6.625– 7.25
Cream White	5.625– 6.25	5.625– 6.25
Light Amber	3.875– 4.50	3.875– 4.50
Amber	3.625– 4.25	3.625– 4.25
Red	3.50 – 3.75	3.50 – 3.75

Wax

WESTERN PENNA. REFINERS' QUOTATIONS

In bbls., carloads, N. Y		
122-124 A.m.p., w.c. scale	(e)6.75	(e)6.75
124-126 A.m.p., w.c. scale	6.75 – 7.00	6.75 – 7.00

OKLAHOMA Refiners' Quotations & Sales Prices. (In bbls. or burlap bags, carloads)

124-126 A.m.p., w.c. scale	(h)6.75	(h)6.75

CHICAGO QUOTATIONS (FOB Chicago district refinery of one refiner, in bags or slabs loose, carloads. Melting points are E.M.P. (A.S.T.M.) methods; add 3° F. to convert into A.m.p.)

Fully refined:		
122-124 (bags only)	6.10	6.10
125-127	6.10	6.10
127-129	6.35	6.35
130-132	6.65	6.65
132-134	6.90	6.90
135-137	7.65	7.65

(a) Prices FOB. Central Michigan refinery group basis, for shipment within Mich. Shipments may originate at plants outside Central group. (b) For shipment to Texas and New Mexico destinations: Group 3 prices quoted on northern shipments. (e) Excluding Detroit shipment. (e) One refiner quoting. (f) No quotations reported. (g) To resellers holding licenses. (h) Two refiners quoting. (j) For shipment to Ark. points only. (k) Two suppliers quoting. (l) Quotations. (m) Sales. (n) No quotations reported. (o) Prices since Nov. 20 have applied on No. 3 instead of on 28-30 grav. zero.

TANK WAGON MARKETS

Tank car, tank wagon, dealer, and service station prices for gasoline **do not include taxes:** *they do, however, include inspection fees as shown in general footnote. Gasoline taxes, shown in separate column, include* 1c *federal, and state taxes; also city and county taxes as indicated in footnotes. Kerosine tank wagon prices also do not include taxes; kerosine taxes, where levied, are indicated in footnotes. Dealer discounts are shown in footnotes; for commercial consumer discounts, see NPN for March 29, April 12, April 19 and June 7, 1939, or write to N.P.N. These prices in effect Dec. 11, 1939, as posted by principal marketing companies at their headquarters offices, but subject to later correction.*

S. O. New Jersey

Essolene
(*Regular Grade*)

	Consumer Tank Car	Dealer T.W.	Gaso-line Taxes	Kero-sine T.W.
*Atlantic City, N. J.	7.6	8.7	4	7.6
*Newark, N. J.	7.6	8.7	4	7.6
Annapolis, Md.	8.35	9.35	5	9.50
Baltimore, Md.	7.75	8.75	5	8.5
Cumberland, Md.	9.15	10.15	5	10
Washington, D. C.	8.0	9	3	9.5
Danville, Va.	8.95	11.45	6	12.9
Norfolk, Va.	7.75	10.25	6	11
Petersburg, Va.	8.05	10.55	6	11.7
Richmond, Va.	8.05	10.55	6	10.7
Roanoke, Va.	9.25	11.75	6	11
Charleston, W. Va.	8.55	11.05	6	12.6
Parkersburg, W. Va.	7.85	9.85	6	11.2
Wheeling, W. Va.	8.85	10.75	6	12.2
Charlotte, N. C.	9.9	11.4	7	11.8
Hickory, N. C.	10.45	11.95	7	12.3
Mt. Airy, N. C.	10.3	11.8	7	12.2
Raleigh, N. C.	9.65	11.15	7	11.5
Salisbury, N. C.	9.85	11.45	7	11.9
Charleston, S. C.	7.75	10.25	7	10.6
Columbia, S. C.	8.6	11.1	7	11.5
Spartanburg, S. C.	9.3	11.8	7	12.2

Discount to undivided dealers on Essolene: thru territory, except New Jersey points, which see in "Note" below: Dealer t.w. price less 0.5c per gal.

*Effective Sept. 14, 1939, S. O. New Jersey posted a minimum retail resale price of 11.9c thru New Jersey.

Note: While the above posted prices continue at Atlantic City and Newark, N. J., dealers will pay a net price of 8.6c per gal. for Essolene. Dealers having pumps marked only, Esso, Essolene and "Standard" White gasoline will pay 8.1c per gal. for Essolene.

Kerosine Discount: 1c off t.w. price for 25 gals., or more, under contract thru territory (Baltimore City contract not necessary) except no discount in state of New Jersey.

Socony-Vacuum Oil Co., Inc.

(*S. O. New York Division*)

Socony Mobilgas
(*Regular Grade*)

	Con-sumer Tank Car	"Split" Deal-er T.W.	Gaso-line Taxes	Kero-sine T.W.
Metropolitan N.Y.City: Boroughs of Manhattan, Bronx and Brooklyn (Kings and Queens)	7.7	9.2	*5	8.10
Borough of Richmond (Staten Is.)	7.7	9.2	*5	8.10
Albany, N. Y.	7.6	9.6	5	7.90
Binghamton, N. Y.	8.9	9.5	5	8.90
Buffalo, N. Y.	8.1	9.5	5	7.6
Jamestown, N. Y.	7.7	9.5	5	7.7
Plattsburg, N. Y.	8.1	10.4	5	8.50
Rochester, N. Y.	8.3	10	5	8.4
Syracuse, N. Y.	8.2	9.5	5	8.40
Bridgeport, Conn.	7.8	8.8	4	7.10
Danbury, Conn.	8.3	9.6	4	8.60
Hartford, Conn.	7.9	9.3	4	8.00
New Haven, Conn.	7.8	8.8	4	7.10
Bangor, Me.	7.9	10	5	8.00
Portland, Me.	7.6	9.4	5	8.10
Boston, Mass.	7.5	9	4	8.10
Concord, N. H.	8.4	10.7	5	8.70
Lancaster, N. H.	9.2	11.5	5	9.50
Manchester, N. H.	8.3	10.3	5	8.50
Providence, R. I.	7.5	9.3	5	8.10
Burlington, Vt.	8.1	10.0	5	8.30
Rutland, Vt.	8.5	10.5	5	8.50

*Plus 2% city sales tax computed at time of each sale.

Discount to undivided dealers: 0.5c less than "split" dealer t.w.

Atlantic Refining

Atlantic White Flash Gasoline
(*Regular Grade*)

	Commer-cial Tank Car	Dealer T.W.	Gaso-line Taxes	Kero-sine T.W.
Philadelphia, Pa.	8	9	5	10
Pittsburgh	8	9.5	5	10.5
Allentown	8	9.5	5	10.5
Erie	8	9.5	5	10
Scranton	8.5	10	5	10.5
Altoona	8	10	5	10.5
Emporium	8	10	5	10.5
Indiana	8	10	5	10.5
Uniontown	8	10	5	10.5
Harrisburg	8	9.5	5	10.5
Williamsport	8.5	10	5	10.5
Dover, Del.	...	9.5	5	10.5
Wilmington	...	9	5	9.75
Boston, Mass.	...	9	4	8
Springfield, Mass.	...	9	4	8.2
Worcester, Mass.	...	9.5	4	8
Fall River, Mass.	...	9	4	8.1
Hartford, Conn.	...	9.3	4	8
New Haven, Conn.	...	8.8	4	8
Providence, R. I.	...	9.3	4	8
Atlantic City, N. J.	...	8.6	4	7.75
Camden, N. J.	...	8.6	4	7.25
Trenton, N. J.	...	8.6	4	7.75
Annapolis, Md.	...	9.35	5	9.5
Baltimore, Md.	...	8.75	5	8.5
Hagerstown, Md.	...	9.85	5	10
Richmond, Va.	...	10.55	6	10.7
Wilmington, N. C.	...	10.35	7	10.8
Brunswick, Ga.	...	10	7	*11
Jacksonville, Fla.	...	8	8	10

*Georgia has kerosine tax of 1c per gal., not included in above price.

Discount to undivided dealers: Dealer t.w. less 0.5c per gal. except in Georgia and Florida, dealer t.w. and undivided dealer price is same.

Discounts: At Scranton, Pa., 1c per gal. voluntary discount allowed to dealers only, effective July 8, 1939.

Kerosine discount: Thru Pennsylvania and Delaware, 2c per gal. off t.w. price on t.w. deliveries of 25 gals. or more at one time, effective since Oct. 29, 1936.

S. O. Ohio

Sohio X-70 Gasoline
(Regular Grade)

	Con-sumer T.W.	†Div-ided Dlr.	‡S.S.	Gaso-line Taxes	Kero-sine T.W.
Ohio, Statewide	11	10	13	5	*12
Akron	11	9	13	5	*8.5
Cincinnati	11	9.5	12	5	*12
Cleveland	11	9	11.5	5	*12
Columbus	11	9.5	12	5	*12
Dayton	11	9.5	12	5	*12
Marietta	11	9.5	12	5	*12
Portsmouth	11	10	13	5	*12
Toledo	11	9	11.5	5	*12
Youngstown	11	9.5	12	5	*11.5

Renown Gasoline
(Third Grade)

Ohio, Statewide	11	10	13	5	....
Akron	11	9	11	5	....
Cincinnati	11	9.5	12	5	....
Cleveland	11	9	11.5	5	....
Columbus	11	9.5	12	5	....
Dayton	11	9.5	12	5	....
Marietta	11	9.5	12	5	....
Portsmouth	11	10	13	5	....
Toledo	11	9	11.5	5	....
Youngstown	11	9.5	12	5	....

Note: Prices at other Ohio points may be obtained by writing NPN.

*Ohio has kerosine tax of 1c per gal., not included in above prices.

†This price also to authorized agents, exclusive of 0.5c rental.

‡Prices are at company-operated service stations.

Discount to undivided dealers: 0.5c less than divided dealer t.w.

S. O. Kentucky

Crown Gasoline
(*Regular Grade*)

	Con-sumer T.W.	Net Dlr.	Gaso-line Taxes	Kero-sine T.W.
Covington, Ky.	12	9	6	9.5
Lexington, Ky.	13.5	10.5	6	10
Louisville, Ky.	12.5	9.5	6	9
Paducah, Ky.	12.5	9.5	6	9
Jackson, Miss.	12.5	9.5	7	*9.5
Vicksburg, Miss.	12.5	9.5	7	*9
Birmingham, Ala.	13.5	10.5	*8	9
Mobile, Ala.	12.5	9.5	*9	8
Montgomery, Ala.	13.5	10.5	*9	*10
Atlanta, Ga.	14	11	7	*8
Augusta, Ga.	13.5	10.5	7	*9
Macon, Ga.	14	11	7	*9.5
Savannah, Ga.	12.5	9.5	7	*8
Jacksonville, Fla.	11	8	8	8
Miami, Fla.	12	9	8	7
Pensacola, Fla.	12.5	9.5	*9	8.5
Tampa, Fla.	13	10	8	8.5

Kyso Gasoline
(*Third Grade*)

Covington, Ky.	10.5	8	6	....
Lexington, Ky.	12	9.5	6	....
Louisville, Ky.	10	7.5	6	....
Paducah, Ky.	10.5	8	6	....
Jackson, Miss.	11	8.5	7	....
Vicksburg, Miss.	11	8.5	7	....
Birmingham, Ala.	11.5	9	*8	....
Mobile, Ala.	10	7.5	*9	....
Montgomery, Ala.	11.5	9	*9	....
Atlanta, Ga.	11	8.5	7	....
Augusta, Ga.	12	9.5	7	....
Macon, Ga.	11	8.5	7	....
Savannah, Ga.	10.5	8	7	....
Jacksonville, Fla.	9.5	7	8	....
Miami, Fla.	10.5	8	8	....
Pensacola, Fla.	10.5	8	*9	....
Tampa, Fla.	11.5	9	8	....

Discounts to all tank wagon consumers: Effective Jan. 4, 1937, thru territory, on Crown gasoline, 3c per gal. below consumer t.w. price; on Kyso, 2.5c below, regardless of quantity purchased, per month

*Taxes: In the tax column is included these city and county gasoline taxes at the following points: Mobile, 2c city; Birmingham, 1c city; Montgomery, 1c city and 1c county; Pensacola, 1c city. Georgia and Montgomery, Ala. have kerosine taxes of 1c per gal., and Mississippi 0.5c, not included in above prices.

S. O. Indiana

Red Crown (*Regular Grade*)
Stanolind (*Third Grade*)

	Red Crown Cons. T.W.	Dealer Prices Red Crown	Stano-lind	Gaso-line Taxes	Kero-sine T.W.
Chicago, Ill.	11.1	9.1	6.9	4	10
Decatur, Ill.	11.1	8.1	6	4	8.5
Joliet, Ill.	11.1	9.6	8.1	4	10
Peoria, Ill.	11.1	8.7	8.1	4	10
Quincy, Ill.	10.9	9.4	8.5	4	9.8
Indianapolis, Ind.	11.8	9.3	8.4	5	*10
Evansville, Ind.	11.6	10.1	9.4	5	*10.5
South Bend, Ind.	11.8	10.3	7.3	5	*10
Detroit, Mich.	9.6	8.1	7.6	4	7.6
Grand Rapids, Mich.	9.9	8.4	7.9	4	9.7
Saginaw, Mich.	10.8	9.3	8.6	4	9.3
Green Bay, Wis.	11.9	10.4	9.9	5	10
Milwaukee, Wis.	11.3	9.8	9.3	5	10.2
La Crosse, Wis.	11.5	10	9.5	5	10.4
Minneapolis-St. Paul	11.5	10	9.5	5	10.4
Duluth, Minn.	11.9	10.4	9.9	5	10.8
Mankato, Minn.	11.5	10	9.5	5	9.9
Des Moines, Ia.	10.9	9.4	7.4	4	*9.8
Davenport, Ia.	11.1	9.6	8.4	4	*10
Mason City, Ia.	11.3	9.8	6.9	4	*10.2
St. Louis, Mo.	10.7	9.2	7.5	*4	8
Kansas City, Mo.	10.4	8.9	6.9	*4	8
St. Joseph, Mo.	10.4	8.9	8.4	4	7.9
Fargo, N. D.	12.7	11.2	10.7	5	11.6
Huron, S. D.	12	10.5	10	5	10.9
Wichita, Kans.	9.3	7.1	6	4	7.9

*Taxes: in the tax column is included these city and state gasoline taxes at following points: Kansas City, St. Joseph and St. Louis, 1c city tax. Kerosine taxes: Indiana has 4c, Iowa 3c per gal. state tax, not included in above prices.

S. O. Nebraska

Standard Red Crown Gasoline
(*Regular Grade*)

	T.W.	Dealer	Gaso-line Taxes	Kero-sine T.W.
Omaha, Neb.	10.5	7.5	6	9.8
McCook	10.5	8.4	6	9
Norfolk	11.3	9.8	6	9.5
North Platte	11.8	8.9	6	10
Scottsbluff	12.5	9.5	6	11.4

S. O. Louisiana

Essolene
(*Regular Grade*)

	Consumer Tank Car	Dealer T.W.	Gaso-line Taxes	Kero-sine T.W.
Little Rock, Ark.	7.75	10.25	7.5	10
Alexandria, La.	7.25	9.75	8	*11.5
Baton Rouge, La.	7.25	9.75	8	*9.5
New Orleans, La.	7.25	9.75	*10	*9
Lake Charles, La.	7.25	9.75	8	*11.5
Shreveport, La.	6	8.5	8	*10
Lafayette, La.	7.5	10	8	*10
Bristol, Tenn.	10.25	9.75	8	13
Chattanooga, Tenn.	9.5	12	8	12
Knoxville, Tenn.	10	12.5	8	13
Memphis, Tenn.	8	10.5	8	11
Nashville, Tenn.	9	11.5	8	11

*Taxes: New Orleans gasoline tax includes 7c state, 1c federal, and 2c parish tax. Louisiana has kerosine tax of 1c per gal.; in addition New Orleans has 1c parish tax, none of which are included in above prices.

Price basis to dealers: Undivided dealers get dealer price, less 0.5c.

Above prices include these inspection fees on both gasoline and kerosine unless otherwise specified, per gallon, figured on basis of 50 gallons per barrel:

Alabama, 1/40c on gasoline, 1/2c on kerosine; Arkansas, 1/5c per gal. in a single barrel, 1/20c per gal. in bulk; Florida 1/8c; Illinois, 3/100c; Indiana, 1/5c per gal. in lots up to 25 bbls.; 2/25c per gal. in lots of 25 bbls. or more; Kansas, 1/50c, (3/50c can be charged to meet inspection department expenses); Louisiana, 1/32c; Minnesota, 1/25c; Missouri, 3/100c; Nebraska, 3/100c; Nevada, gasoline, 1/20c; North Carolina, 1/4c; North Dakota, 1/20c; Oklahoma, 2/25c per gal. lots of more than 50, in bbls., 1/5c in lots less than 50 bbls.; South Carolina, 1/8c; South Dakota, 1/10c; Tennessee, 2/5c; and Wisconsin, 3/100c.

Kerosine inspection fee only: Iowa, 3/50c; Michigan, 1/5c per gal.

TANK WAGON MARKETS

Tank car, tank wagon, dealer, and service station prices for gasoline **do not include taxes;** *they do, however, include inspection fees as shown in general footnote. Gasoline taxes, shown in separate column, include 1c federal, and state taxes; also city and county taxes as indicated in footnotes. Kerosine tank wagon prices also do not include taxes; kerosine taxes, where levied, are indicated in footnotes. Dealer discounts are shown in footnotes; for commercial consumer discounts, see NPN for March 29, April 12, April 19 and June 7, 1939, or write to NPN. These prices in effect Dec. 11, 1939, as posted by principal marketing companies at their headquarters offices, but subject to later correction.*

Humble Oil & Refining Co.

Humble Motor Fuel
(Regular Grade)

	*T.W.	S.S.	Gasoline Taxes	Kerosine T.W.
Dallas, Tex	7	11	5	8
Ft. Worth, Tex	7	11	5	7
Houston, Tex	9	13	5	8
San Antonio, Tex	9	13	5	8

Thriftane
(Leaded, 67 Octane, Purple Gasoline)

Dallas	5.5	9	5	
Ft. Worth	5.5	9	5	
Houston	7.5	11	5	
San Antonio	8	11	5	

U. S. Motor Gasoline
(Third Grade)

San Antonio, Tex	8	..	5	

*These tank wagon prices apply to all classes of dealers and consumers.

Continental Oil

Conoco Bronz-z-z (Regular Grade)

	††T.W.	Dealer	Gasoline Taxes	Kerosine ‡T.W.
Denver, Col	10.5	..	5	11.5
Grand Junction, Col	13.5	..	5	15
Pueblo, Col	11	..	5	9
Casper, Wyo	12.5	..	5	11.5
Cheyenne, Wyo	10.5	..	5	13
Billings, Mont	12.5	..	6	13
Butte, Mont	14	..	6	15.5
Great Falls, Mont	13.5	..	6	15.5
Helena, Mont	14.5	..	6	15.5
Salt Lake City, Utah	8.5	8.5	5	16
Boise, Ida	**15.1	**15.1	6	18
Twin Falls, Ida	**15.1	**15.1	6	18
Albuquerque, N. M	10.5	10.5	†6.5	10
Roswell, N. M	9.5	9.5	†6.5	8
Santa Fe, N. M	10.5	10.5	*7	10
†Ft. Smith, Ark	9.5	..	5	7.5
Little Rock, Ark	9.75	..	7.5	8
Texarkana, Ark	9	..		8
Muskogee, Okla	8	..	5	7
Oklahoma City, Okla	6	..	5	6.5
Tulsa, Okla	7	..	5	7

Demand Gasoline
(Third Grade)

Denver, Col	9.5	..	5	....
Grand Junction, Col	12.5	..	5	....
Pueblo, Col	10	..	5	....
Casper, Wyo	11.5	..	5	....
Cheyenne, Wyo	9.5	..	5	....
Billings, Mont	11.5	..	6	....
Butte, Mont	11	..	6	....
Great Falls, Mont	11.5	..	6	....
Helena, Mont	13.5	..	6	....
Salt Lake City, Utah	8.5	8.5	5	....
Boise, Ida	**14.1	**14.1	6	....
Twin Falls, Ida	**14.1	**14.1	6	....
Albuquerque, N. M	8.5	8.5	†6.5	....
Roswell, N. M	8.5	8.5	†6.5	....
Santa Fe, N. M	9.5	9.5	*7	....
Ft. Smith, Ark	7	..	5	....
Little Rock, Ark	7.5	..	7.5	....
Texarkana, Ark	6.5	..	5	....
Muskogee, Okla	7	..	5	....
Oklahoma City, Okla	5.5	..	5	....
Tulsa, Okla	5	..	5	....

†Includes city tax of 0.5c.
*Includes 1c city tax.
‡Prices are in t.w. deliveries to consumers and dealers.
**Prices include 0.1c to cover 1-mill tax for toll bridges.
††T.w. prices in all states except Utah, Idaho and New Mexico are to consumers and dealers.

S. O. California

Standard Gasoline
(Regular Grade)

	T.W.	S.S.	Gasoline Taxes	Kerosine T.W.
San Francisco, Cal	13.5	14.5	4	11.5
Los Angeles, Cal	13	14	4	10
Fresno, Cal	14.5	15.5	4	12.5
Phoenix, Ariz	14	15	6	*12.5
Reno, Nev	15.5	16.5	5	13.5
Portland, Ore	14	15	6	13.5
Seattle, Wash	14	15	6	†13.5
Spokane, Wash	15.5	16.5	6	†16.5
Tacoma, Wash	14	15	6	†13.5

Flight Gasoline
(Third Grade)

San Francisco, Cal	12	13	4	....
Los Angeles, Cal	11.5	12.5	4	....
Fresno, Cal	13	14	4	....
Reno, Nev	14	15	5	....
Phoenix, Ariz	11	12	6	....
Portland, Ore	12.5	13.5	6	....
Seattle, Wash	12.5	13.5	6	....
Spokane, Wash	13	14	6	....
Tacoma, Wash	12.5	13.5	6	....

*Arizona has kerosine tax of 5c per gal., not included in above prices.

†Washington has 0.25c per gal. tax on kerosine sales, not included in above prices.

Discount to 100% dealers, thru territory, off posted t.w. prices, on gasolines: on Standard Ethyl, Standard Gasoline and Stanavo Aviation, 3c per gal.; on Flight gasoline, 2c.

Canada

PRICES OF IMPERIAL OIL LTD.
Per Imperial Gallon, which is 1.2 U. S. Gallons
3-Star Imperial Gasoline
(Regular Grade)

	T.W.	Gasoline Taxes	Kerosine T.W.
Hamilton, Ont	15.5	8	16
Toronto, Ont	15.5	8	16
Brandon, Man	21	7	22
Winnipeg, Man	19.5	7	20.5
Regina, Sask	18.5	7	20.5
Saskatoon, Sask	21	7	23
Edmonton, Alta	18.9	7	20.9
Calgary, Alta	16	7	18
Vancouver, B. C	16	7	23
Montreal, Que	15	8	15.5
St. John, N. B	14.5	10	18.5
Halifax, N. S	14.5	10	18.5

Discounts to undivided dealers, 1c off t.w. price, except Maritime Provinces where undivided dealers pay t.w. price. Divided dealers pay t.w. price, thru territory.

Aviation Gasoline

Following are tank car, tank wagon or dealer prices, as indicated, of aviation gasoline in several marketing territories.

S. O. OHIO
Thru Ohio
Esso Aviation

	Consumer T.W.	Gasoline Taxes
74 octane	16	5
80 octane	17	5
87 octane	18	5

Discounts: For delivery on contract to hangar operators and resellers: 2c below consumer posted t.w. price, shown above.

S. O. INDIANA
Stanavo Ethyl Aviation Gasoline
73 Octane Number

Chicago, Ill	14.9	
Detroit, Mich	16.5	4
Milwaukee, Wis	15.1	5
Minneapolis, Minn	15.3	5
St. Louis, Mo	14.5	3
Kansas City, Mo	14.2	*4
Fargo, N. D	16.5	4
Huron, S. D	15.8	5

*Includes 1c city tax.

HUMBLE OIL & REFINING CO.
74 Octane Aviation Gasoline, Clear

	Tank Car
FOB Baytown, Tex	8.5

CONTINENTAL OIL CO.
Conoco Special Gasoline

	T.W. & Dealer Price	Gasoline Taxes
Denver, Colo	15	5
Cheyenne, Wyo	15.5	5
Helena, Mont	22.5	6
Salt Lake City, Utah	18	5
Albuquerque, N. M	14	*6.5

*Includes city tax of 0.5c.

S. O. CALIFORNIA
Stanavo Aviation Gasoline

	T.W.	
Phoenix, Ariz	17.5	6
Los Angeles, Cal	15	4
San Francisco, Cal	15.5	4
Reno, Nev	17.5	5
Portland, Ore	16	6
Seattle, Wash	16	6
Spokane, Wash	19	6

Note: For discounts, etc., see note under Standard and Flight gasoline above.

Naphtha (In Tank Wagon)

S. O. NEW JERSEY

	Posted Tank Wagon Prices Mineral Spirits	V.M. & P.
Newark, N. J	11.5	15.5
Baltimore, Md	15.5	....
Washington, D. C	15	....

Discounts: Buyers taking following quantities at one time, get these discounts. Newark, 2c per gal. on 200 gals. or more; less than 200 gals., 0.5c higher price. Baltimore 2c off on 25 to 100 gals. and 3c on over 100 gals. Washington, 2c off to contract buyers.

SOCONY-VACUUM OIL CO.

Buffalo, N. Y	11.5	12.5
*New York City	9.5	10.5
Rochester, N. Y	12.5	12.5
Syracuse, N. Y	12.5	15
Boston, Mass	11.5	11.5
Bridgeport, Conn	11.5	12
Hartford, Conn	11	11.5
Providence, R. I	11.5	12.5

*Prices apply to consumers only in quantities over 1,000 gals. annually. For quantities under 1,000 gals. annually, add 0.5c per gal.

ATLANTIC REFINING CO.

Philadelphia, Pa	12	14.5
Lancaster, Pa	13.5	16
Pittsburgh, Pa	14.5	14.5

Note: Prices for Mineral Spirits also apply to Stoddard Solvent; and prices for V.M.&P. Naphtha apply also to Light Cleaners Naphtha.

Discounts: Philadelphia, 200 gals. or more at one time, 2c per gal. less. Lancaster, contract buyers taking 1,000 gals. or more per year, one drum up, 2c per gal. less; non-contract buyers, 200 gals. or more at one time, 2c per gal. less. Pittsburgh, 500 gals. or more at one time, 2c.

S. O. OHIO

	S.R. Solvent	V.M.&P. Naphtha
Thru Ohio	12.5	13

Note: V.M.&P. naphtha prices also apply on Dry Cleaners naphtha, special Varnolene, Varnolene and Sohio Solvent. Discounts to contract consumers off t.w. price; 300 to 999 gals., 0.5c; 1,000 to 2,499 gals., 0.75c; 2,500 to 4,999 gals., 1c; 5,000 or more gals., 1.5c.

S. O. INDIANA
(Prices include state and federal taxes)

	Oleum Spirits	V.M.&P. Naphtha	Stanisol
Chicago, Ill	16.7	17	16.4
Detroit, Mich	19.7	18.7	20.2
Kansas City, Mo	14.4	15.4	14.9
St. Louis, Mo	14.7	15.7	13.4
Milwaukee, Wis	19.3	20.3	19.8
Minneapolis, Minn	19.5	20.5	18.2

Note: All prices, with exception of Missouri points, include state tax. Prices shown are base prices, before discounts.

Naphtha (In Tank Cars)

In Tank Cars (F. o. b. refinery or seaboard terminal except Ohio, delivered price.)

	V.M.&P. Naphtha	Mineral Spirits
Baltimore	9.50	8.50
New York Harbor	9-9.5	8.75-9
Philadelphia district	10	8.25-9
Boston	9.5	9.5
Providence	9.5	9.5
†Ohio points, delivered	8.75	*8.25

*This is on rubber solvent.
†Ohio prices are those of S. O. Ohio. Its prices for D.C. naphtha, special Varnolene, Varnolene and Sohio Solvent are same as for V.M.&P.

Price Changes

Dates and amounts of changes. See table for full current prices.

Socony-Vacuum—Socony Mobilgas:
Portland split dealer t. w. up 0.1c, Dec. 4.
Concord split dealer t. w. up 0.2c, Dec. 4.
Manchester split dealer t. w. up 0.3c, Dec. 4.
Burlington split dealer t. w. cut 0.2c, Nov. 8.

Kerosine:
Bangor t. w. cut 0.5c, Dec. 8.

Atlantic Refining—Kerosine:
Fall River t. w. up 0.1c, Dec. 4.
T. w. up 0.15c, thru New Jersey, Dec. 5.

S. O. Ohio—Sohio X-70 and Renown Gasolines:
Corrections: Divided dealer prices at Cincinnati, Columbus, Dayton, and Youngstown have been 9.5c, ex tax, since Oct. 7. This price should have been published in all subsequent issues, instead of the 10c shown.

S. O. Kentucky—Crown Gasoline:
Tampa up 0.5c, Nov. 28.

Kyso Gasoline:
Macon cut 1c, Nov. 28.
Tampa up 0.5c, Nov. 28.

Kerosine:
Mobile t. w. cut 1c, Nov. 29.

S. O. Indiana—Red Crown and Stanolind:
Grand Rapids cut 0.1c, Dec. 2.

Stanolind:
South Bend dealer price cut 2.3c, Nov. 8.

S. O. Nebraska—Red Crown Gasoline:
North Platte dealer price cut 1c, Nov. 29.

(Continued on next page)

Price Changes

(Continued from preceding page)

Humble Oil & Refining Co.—Humble Motor Fuel:
San Antonio cut 0.5c, Dec. 2.
Thriftane:
San Antonio s. s. cut 0.5c, Dec. 2.

Fuel Oil

S. O. New Jersey—Nos. 1, 2 and 4:
Atlantic City and Newark up 0.15c, Dec. 2.
Baltimore and Washington Nos. 2 and 4 up 0.25c, Dec. 6.
Atlantic Refining—Nos. 2 and 4:
Springfield No. 2 up 0.1c, Dec. 4.
Worcester and Hartford up 0.1c, Dec. 4.

Coming Meetings

Mid-Continent Oil & Gas Assn., Annual Meeting of General Board of Directors, Tulsa Club Roof, Tulsa, Dec. 18.

1940

Society of Automotive Engineers, Annual meeting and Engineering Display, Book-Cadillac Hotel, Detroit, Jan. 15 to 19.

Oil Trades Assn. of New York, Waldorf-Astoria Hotel, New York, Jan. 23.

Northwest Petroleum Assn., Annual Meetings: North Dakota Division, Gardner Hotel, Fargo, N. D., Jan. 22, 23; Minnesota Division, Nicollet Hotel, Minneapolis, Jan. 25, 26.

American Institute of Mining and Metallurgical Engineers, New York, Feb. 12 to 15.

Kentucky Petroleum Marketers Assn., 14th annual meeting and convention. Brown Hotel, Louisville, Ky., Feb. 14, 15.

Assn. of Highway Officials of North Atlantic States, Hotel Ambassador, Atlantic City, N. J., Feb. 14-16.

Missouri Independent Oil Jobbers Assn., Annual Convention, Elms Hotel, Excelsior Springs, Mo., Feb. 21 and 22.

National Dixie Distributors, Milwaukee, Wis., Feb. 21, 22.

Wisconsin Petroleum Assn., annual meeting and equipment show, Schroeder Hotel, Milwaukee, Feb. 21, 22, 23.

Ohio Petroleum Marketers Assn., Deshler-Wallick Hotel, Columbus, O., Feb. 27, 28 and 29.

Illinois Petroleum Marketers Assn., Peoria, Ill., Feb. 27-29.

Iowa Independent Oil Jobbers' Assn., annual meeting, Hotel Fort Des Moines, Des Moines, March 5-7.

American Society for Testing Materials, Statler Hotel, Detroit, Mich., March 4-8.

American Petroleum Institute, Mid-Continent District, Division of Production, Wichita, Kan., March 14, 15.

American Petroleum Institute, Southwestern District, Division of Production, Houston, Tex., March 28, 29.

Western Petroleum Refiners Assn., Annual Meeting, Allis Hotel, Wichita, Kans., Mar. 31, Apr. 1, 2.

American Chemical Society, Cincinnati, Ohio, April 8-12.

American Assn. of Petroleum Geologists, Stevens Hotel, Chicago, April 10, 11, 12.

American Petroleum Institute, Eastern District, Division of Production, Columbus, O., April 11, 12.

National Petroleum Assn., 37th semi-annual meeting, Hotel Cleveland, Cleveland, O., April 18, 19.

American Institute of Mining & Metallurgical Engineers, Open Hearth Conference, Pittsburgh, Pa., April 24-26.

Petroleum Industry Electrical Assn., Dallas, Tex., May 1 to 3.

American Institute of Chemical Engineers 32nd Semi-Annual Meeting, Statler Hotel, Buffalo, N. Y., May 13, 14 and 15.

Natural Gasoline Assn. of America, 19th annual convention, Hotel Tulsa, Tulsa, May 15, 16, 17.

International Petroleum Exposition and Congress, Tulsa, May 18-25.

American Petroleum Institute, 10th Mid-Year Meeting, Fort Worth, Tex., May 27-31.

American Society for Testing Materials, Chalfonte-Haddon Hall, Atlantic City, N. J., June 24-28.

Alabama Petroleum Industries Committee, Birmingham, Ala., sometime in July.

38th Annual Meeting of the National Petroleum Assn., Hotel Traymore, Atlantic City, N. J., Sept. 18-20.

National Safety Congress & Exposition, Hotel Stevens, Chicago, Ill., Oct. 7-11

Group 3 Freight Rates

To Division Headquarters Points of Standard Oil Co. of Indiana

	Gasoline-Kerosine		Distillate-Gas Oil-Fuel Oil	
	Cents per Cwt.	Cents per gal. 6.6 lbs.	Cents per Cwt.	Cents per gal. 7.4 lbs.
Chicago, Ill.	40	2.640	32	2.368
Decatur, Ill.	39	2.574	31	2.294
Joliet, Ill.	40	2.640	32	2.368
Peoria, Ill.	39	2.574	31	2.294
Quincy, Ill.	36	2.376	29	2.146
Indianapolis, Ind.	48	3.168	39	2.886
Evansville, Ind.	46	3.036	37	2.738
South Bend, Ind.	49	3.234	**42	**3.108
Detroit, Mich.	64	4.224	51	3.774
Gd. Rapids, Mich.	61	4.026	50	3.700
Saginaw, Mich.	66	4.356	53	3.922
Green Bay, Wis.	51	3.366	41	3.034
Milwaukee, Wis.	43	2.838	34.5	2.553
LaCrosse, Wis.	46	3.036	37	2.738
Min'ap'ls-St. Paul	46	3.036	37	2.738
Duluth, Minn.	52	3.432	41.5	3.071
Mankato, Minn.	46	3.036	37	2.738
Des Moines, Ia.	36	2.376	29	2.146
Davenport, Ia.	39	2.574	31	2.294
Mason City, Ia.	42	2.772	33.5	2.479
St. Louis, Mo.	33	2.178	26.5	1.961
Kansas City, Mo.	28	1.848	22.5	1.665
St. Joseph, Mo.	28	1.848	22.5	1.665
Fargo, N. D.	63	4.158	50.5	3.737
Minot, N. D.	83	5.478	66.5	4.921
Huron, S. D.	53	3.498	42.5	3.145
Wichita				
From Ponca City	7.5	*0.495	7.5	†0.555
From Tulsa	12.5	*0.825	12.5	†0.925
From Cushing	11	*0.726	11	†0.814

*This rate also includes distillate rate at 6.6 lbs. per gal.

**This rate applies only to residual fuel and gas oil. Combination rate of 32c per cwt. at 7.4, Group 3 to Chicago, plus 9c per cwt. at 6.6, Chicago to South Bend, total of 2.962c per gal., applies to petroleum fuel oil distillate not suitable for illuminating purposes.

†This rate is exclusive of distillate which is based on 6.6 lbs. per gal. from Ponca City, Tulsa and Cushing, Okla., to Wichita. Includes only gas oil and fuel oil.

NOTE: There is no Group 3 rate to Wichita, Kans.

Lake Oil Shipping Gained in 1938

Water movement of petroleum and its products on the Great Lakes, according to preliminary reports of the U. S. Engineers' district offices, in 1938 showed a large gain over 1937. Shipments of refined products from the four main oil shipping ports, as listed in an accompanying table, increased from 17,821,500 barrels in 1937 to over 28,000,000 barrels in 1938. These preliminary figures are subject to later revision.

Total receipts of refined products at ports on the Lakes, also shown in detail in the table, showed a considerable gain in 1938 from 1937. Lake shippers say the increase reflects the larger number of terminals operated by both the large oil companies and independent marketers.

The fleet of vessels serving the Great Lakes in 1939 in the movement of petroleum and its products numbered 59 steamers, motorships and barges, with a combined gross tonnage of 180,421, the Lake Carriers Association reports. These vessels had a total capacity of 55,750,000 gallons. The 1938 tonnage of oil vessels was about the same as in 1937.

The growth of the movement of oil products on the Great Lakes is shown by the fact 16 vessels were operating in this trade in 1929, with a maximum cargo capacity of 16,500,000 gallons per trip.

TANK WAGON MARKETS. HEATING OILS

Prices in Effect Dec. 11, 1939

Following are posted tank wagon prices of various grades of heating oil at the points shown in various territories. Prices are in cents per gallon.

S. O. NEW JERSEY

	No. 1	No. 2	No. 4
Atlantic City, N. J.	7.75	6.75	6.75
Newark	7.75	6.75	6.75
Annapolis, Md		6.75	
Baltimore	7.25	7.00	6.50
Washington, D. C.	7.50	7.25	7.25
Norfolk, Va.	7.25	6.25	6.25
Petersburg	7.5	6.5	....
Richmond	7.5	6.5	6.5
Charlotte, N. C.	9	7.75	....
Hickory	....	8.25	....
Raleigh	9	7.5	....
Charleston, S. C.	8	6.5	....
Columbia	9	7.5	....
Spartanburg	9.7	8.2	....

SOCONY-VACUUM OIL CO. INC.
(S. O. New York Division)

	Nos. 2 & 3	No. 4
New York City	6.60	6.60
Albany, N. Y.	6.80	6.80
Rochester, N. Y.	7.50	7.50
Boston, Mass.	6.80	6.80
Bangor, Me.	7.20	7.20
Manchester, N. H.	7.10	7.10
Burlington, Vt.	7.50	7.50
Hartford, Conn.	6.90	6.90
New Haven, Conn.	6.80	6.80
Providence, R. I.	6.80	6.80

Note: Prices for No. 1 fuel in Socony-Vacuum territory same as for kerosine which see in tank wagon table for various cities; prices change with kerosine.

ATLANTIC REFINING

	Numbers 1	2	3	4	5	6
Phila., Pa.	8	6.50	6.50	6.50	4.00	3.25
Allentown, Pa.	8.5	6.50	6.50	6.50	....	....
Wilmington, Del.	7.75	6.50	6.50	6.50	....	....
Springfield, Mass.	8.2	7.3	....	....	....	....
Worcester, Mass.	8	7.1	....	7.1	....	....
Hartford, Conn.	8	6.9	....	6.9	....	....

S. O. OHIO

	No. 1	No. 2	No. 3
Columbus Division and Cleveland	7.50	7.50	7.00
City of Lima	8.00	8.00	7.00
Rest of Ohio	8.00	8.00	7.50

Note: S. O. Ohio prices are for full compartment hose dumps, bucket dumps are 0.5c per gallon higher.

S. O. INDIANA
Stanolex Fuel and Furnace Oils

	No. 1 Fuel	Stanolex Furnace
Chicago	(a)6.75	6.75
Indianapolis	....	(b)7.8
Detroit		6.6
Milwaukee	8.4	7.7
Minneapolis	7.8	7.8
St. Louis	7.7	(c)6.7
Kansas City	6.8	6.8

(a) For 400 gals. and over; 150 to 399 gals., 7.25c; 1 to 149 gals., 8.25c.
(b) Excluding 4c state tax.
(c) For 400 gals. & over; 100 to 399 gals., 7c; 1 to 99 gals., 8c.
Note: Small-lot deliveries of light fuel oils range up to 2c higher than above quotations.

SEABOARD MARKETS, EXPORT AND COASTWISE

All prices on this page are publisher's opinion of open market quotations or sales, for spot shipment (10 to 15 days). In cargo markets, spot shipment is 90 days. Prices in cents per gallon, except heavy fuel oil in dollars per barrel, in tank car lots, f.o.b. refineries or seaboard terminals in districts designated, unless otherwise noted. Federal, state or municipal taxes not included. Prices quoted apply on products made from legally produced crude. Unless otherwise noted, gasoline octane ratings are determined by C.F.R. Motor method, A.S.T.M. D-357-33T; and lubricating oil specifications determined according to A.S.T.M. methods, unless otherwise noted.

Atlantic Coast Refiners' & Tanker Terminal Operators' Quotations (FOB Refineries & Terminals)

MOTOR GASOLINE

Prices Effective Dec. 11

District:	60-64 Oct.	65 Oct.	65 Oct. & Above	68-70 Oct.	72-74 Oct.
N. Y. harbor	(m)6.70	6.75 – 7.30	6.75 – 7.30	6.75 – 7.00	6.75 – 7.70
(a) N. Y. harbor	(m)6.70	6.50 – 7.05	6.50 – 7.05	6.50 – 6.75	6.65 – 7.20
Philadelphia	6.50 – 6.75	6.50 – 6.75	6.50 – 6.75	6.50 – 6.75	6.50 – 8.00
Baltimore	6.25 – 6.75	6.50 – 7.00	6.50 – 7.00	6.50 – 6.75	6.75 – 7.75
Norfolk	(r) 6.625–6.875	(r) 6.75 –7.00	(r) 6.75 –7.00	(r) 6.75 –7.25	7.00 – 7.75
Wilm'ton	6.50 – 6.875	6.75 – 7.00	(r) 6.75 –7.00	6.75 – 7.25	7.00 – 7.85
Char'ston	6.625– 6.875	(r) 6.75 –7.00	(r) 6.75 –7.00	(r) 7.00 –7.25	7.50 – 7.55
Savannah	6.50 – 7.125	6.50 – 7.00	6.50 –7.00	(r) 6.75 –7.50	7.00 – 7.25
Jacksonville	6.50 – 6.875	6.50 – 7.00	(r) 6.50 –7.00	(r) 6.75 –7.25	7.00 – 7.25
Miami	(r) 6.625–6.875	(m)7.00	(m)7.00	(m) 7.00 –7.25	(m)7.25
Tampa	(r) 6.50 –6.875	(m)7.00	(m)7.00	(m) 7.00–7.25	(r)7.25
Pensacola	(m) 6.625–6.875	.....	.....	(m) 7.00 –7.25	.....
Mobile	6.00 –6.50	(m)6.50	(m)6.50	(m) 6.75 –7.00	(r)6.75
Portland	.....	(m)7.50	(r)7.50	.....	7.50 – 7.60
Boston	6.50 – 7.25	6.75 – 7.15	6.75 – 7.15	(r) 6.75 –7.00	6.75 – 7.50
Providence	6.80 – 7.25	(r) 7.00 –7.15	7.00 – 7.15	(m)7.00	7.00 – 7.50

WATER WHITE KEROSINE

District:			
N. Y. harbor	5.20	Jacksonville	5.25-5.375
(a)N. Y. harb.	5.10	Miami	(m)5.25-5.375
Phila	5.25	Tampa	(r)5.25-5.375
Baltimore	5.25	Pensacola	(m)5.25-5.375
Norfolk	5.25 – 5.375	Mobile	(m)5.25-5.375
Wilm'ton, N.C.	5.25 – 5.50	Portland	5.50
Charleston	(r)5.25 – 5.375	Boston	5.30
Savannah	5.25 – 5.375	Providence	5.30

FUEL OILS

	N. Y. harb.	N. Y. harb. barges
No. 1	5.20	5.10
Nos. 2-3	4.70	4.60
No. 4	4.70	4.60
No. 5	$1.35 –$1.65	.....
No. 6	$1.15	.....

	Phila. dist.	Balt. dist.
No. 1	5.25	5.25
Nos. 2-3	4.50 – 4.75	4.50 – 4.75
No. 4	4.25 – 4.75	4.25 – 4.75
No. 5	$1.35 –$1.57	$1.35 – $1.55
No. 6	$1.15	$1.15

	Bost. dist.	Prov. dist.
No. 1	5.30	5.30
Nos. 2-3	4.80	4.80
No. 4	4.80	4.80
No. 5	$1.45	$1.40 –$1.45
No. 6	$1.15	$1.15

District:	(c) Bunker C Fuel	(c) Diesel Oil
N. Y. harbor	$1.15	$1.90
Philadelphia	$1.15	$1.90
Baltimore	$1.15	$1.90
Norfolk	$1.15	$1.90
Charleston	$1.10	$1.90
Savannah	$1.10	$1.995
Jacksonville	$1.10	$1.995
Tampa	$1.05	$1.995
Portland	$1.15	$2.00 –$2.20
Boston	$1.15	$1.90
Providence	$1.15	$1.90

	Diesel Oil Shore Plants	Gas House Gas Oil 28-34 Gravity
N. Y. harbor	4.70	4.80
Philadelphia	4.75	.....
Baltimore	4.75	4.75
Norfolk	4.50	.....
Charleston	4.50	.....
Jacksonville	.....	.....
Tampa	.....	.....
Portland	5.00	5.10
Boston	4.80	4.90
Providence	4.80	4.90

Pacific Export

(c) (Quotations at seaboard, Los Angeles, cargo lots, cents per gal., except where otherwise noted.)

Prices Effective	Dec. 11	Dec. 4
U. S. Motor, under 65 octane	5.75 – 6.00	5.75 – 6.00
400 e.p. blend, 65 oct. min	6.00 – 6.25	6.00 – 6.25
390 e.p. blend, 66 oct.	6.125– 6.375	6.125– 6.375
390 e.p. blend, 68 oct.	6.25 – 6.50	6.25 – 6.50
375 e.p. blend, 70 oct.	6.375– 6.75	6.375– 6.75
(d) 38-40 gravity, w.w. kerosine	4.25 – 5.00	4.25 – 5.00
41-43 grav., w.w. kero.	4.50 – 5.00	4.50 – 5.00
44 grav., w.w. kero.	5.00 – 5.50	5.00 – 5.50
Cargo lots, per bbl.		
Diesel fuel, 24 & above	$1.25 –$1.35	$1.25 –$1.35
Diesel fuel, under 24	$1.15 –$1.25	$1.15 –$1.25
(f) 30-34 grav., diesel (gas oil)	$1.25 –$1.35	$1.25 –$1.35
(g) Grade C fuel	$0.68 –$0.73	$0.68 –$0.73

Prices effective	Dec. 11	Dec. 4
In Ships' Bunkers, or deep tank lots, per bbl.:		
(f) Diesel fuel	$1.35 –$1.45	$1.35 –$1.45
(g) Grade C fuel	$0.85 –$0.90	$0.85 –$0.90
Cased Goods: (Per case)		
U. S. M.	$1.45 –$1.55	$1.45 –$1.55
400 e.p. blend, under 65 oct.	$1.50 –$1.60	$1.50 –$1.60
375-400 e.p. blend, 65 oct. & above	$1.60 –$1.70	$1.60 –$1.70
(d) 40-43 grav., w.w. kero	$1.40 –$1.50	$1.40 –$1.50
Kero., p.w.	$1.35 –$1.45	$1.35 –$1.45

New York Export Quotations

(Cents per gal. in bbls. FAS New York)

CYLINDER OILS (Penna. Products)

Bright stock:		
Light, 25 p.t.	(p) 39.00–39.50	(p) 39.00–39.50
Neutral oil:		
200 3 color, 25 p.t.	(n)39.00	(n)39.00
150 3 color, 25 p.t.	(p) 37.00–39.50	(p) 37.00–39.50
600 s.r., unfilt.	(p) 23.00–26.00	(p) 23.00–26.00
650 s.r., unfilt.	(p) 25.00–29.00	(p) 25.00–29.00
600 fl. s.r.	(p) 26.50–31.00	(p) 26.50–31.00
630 fl., s.r.	(p) 31.50–35.00	(p) 31.50–35.00

Seaboard Wax Quotations

(A.S.T.M. Tests. Melting points, however, are A.M.P., 3° higher than E.M.P. Export prices, FAS, c.l. Domestic prices, FOB, refr'ies., in bags, c.l., with 0.2c discount allowed for shipment in bulk, except where noted. Scale solid; fully refined slabs in bags)

Prices Effective	Dec. 11	
	New York	
	Domestic	Export
124-6 Y.C. scale	(n)7.00	(n)7.00
122-4 W.C. scale	.....	.....
124-6 W.C. scale	(n)7.00	(n)7.00
123-5 Fully rfd.	(p) 6.35 –6.40	.....
125-7 Fully rfd.	(n)6.55	(n)7.50
128-30 Fully rfd.	(h&n)6.65-6.75	(n)7.75
130-2 Fully rfd.	(h&n)7.00	(n)8.00
133-5 Fully rfd.	(h&p)7.20-7.30	(n)8.50
135-7 Fully rfd.	(h&n)7.55	(n)9.00
108-111 white Match wax	.....	(n&t)8.00

	New Orleans
	Export
124-6 Y.C. scale	(n)7.00
122-4 W.C. scale	.....
124-6 W.C. scale	(p) 6.75–7.00
123-5 Fully rfd.	.....
125-7 Fully rfd.	(n)7.50
128-30 Fully rfd.	(n)7.75
130-2 Fully rfd.	(n)8.00
133-5 Fully rfd.	(n)8.50

Gulf Coast Bulk

(FOB ship at Gulf for domestic and export; min. 20,000 bbls.)

Prices quoted by individual GCRA refiners on their products meeting GCRA specifications follow:

	Dec. 11
GCRA Spec. Motor Fuels	
65 octane (CFR) unleaded	6.00 – 6.25
68 octane (CFR) unleaded	(p) 6.00 –6.50
70 octane (CFR) unleaded	(n) 6.00 –6.25
72-74 octane (CFR) unleaded	.....
72-74 octane (CFR) leaded	6.125– 6.25
GCRA Spec. Kerosine & Gas Oils	
Kerosine	(p) 4.50 –4.75
43 or below diesel index gas oil	(n)4.00
43-47 diesel index gas oil	(p) 4.00 –4.125
48-52 diesel index gas oil	(p)4.25
53-57 diesel index gas oil	(p) 4.375–4.50
58 & above	(p) 4.50 –4.75

Prices quoted by refiners for other products follow:

MOTOR GASOLINE

Dec. 11

	60-62 Gravity, 400 e.p.	61-63 Gravity, 390 e.p.	64-66 Gravity, 375 e.p.
60 oct.	5.75 – 6.00	(n)6.00	(n)6.00
65 oct.	6.00 – 6.25	(n)6.25	(n)6.375
68 oct.	6.25 – 6.50	(n)6.50	(n)6.625
70 oct.	(n)6.25	.....	.....
72-74 oct. leaded	5.875– 6.50	(n)6.50	(n)6.625

KEROSINE

	Dec. 11	Dec. 4
41-43 grav. w.w.	4.25 – 4.875	4.25 – 4.875

GAS OILS

Gas Oil (i):		
Below 43 diesel index	(n)4.00	(n)4.00
43-47 diesel index	(n)4.125	(n)4.125
48-52 diesel index	4.25 – 4.50	4.25–4.50
53-57 diesel index	(p) 4.375–4.75	(p)4.375–4.75
58 & above	(n)4.50	(n)4.50

LIGHT FUEL OILS

No. 2	4.00 – 4.125	4.00 – 4.125

DIESEL and BUNKER OILS

(c) Diesel Oil	$1.70	$1.70
(c) Grade C bunker oil	$0.90 –$1.00	$0.90 –$1.00
Grade C bunker oil, cargoes	$0.95 –$1.00	$0.95 –$1.00

MID-CONTINENT LUBES

(Cents per gal. at Gulf; in bbls., FAS.; in bulk, FOB terminals)

(*Note*: Refiner quoting low prices shown below for Mid-Continent lubes at Gulf reported Nov. 14 his 1c advance was effective Nov. 13).

	Dec. 11	
	Barrels	Bulk
190 vis. D. 210 brt. stock	(n)33.50	(n)28.80
200 vis. E 210 brt. stock	(n)32.50	(n)27.80
150 vis. D 210 brt. stock 0-10 p.p.	(p) 30.50–31.00	(p) 25.80–26.00
15-25 p.p.	(p) 29.50–30.00	(p) 24.80–25.00
150 vis. E 210 brt. stock	(n)29.50	(n)24.80
100 vis. D 210 brt. stock 0-10 p.p.	(n)29.50	(n)24.80
15-25 p.p.	(n)28.50	(n)23.80
200 vis. No. 3 col. neutral:		
0-10 p.p.	(n)21.00	(n)16.30
15-25 p.p.	(n)20.50	(n)15.80
180 vis. No. 3 col. neutral:		
0-10 p.p.	(n)20.50	(n)15.80
15-25 p.p.	(n)20.00	(n)15.30

SOUTH TEXAS LUBES

(Vis. at 100° cold test 0, bulk export shipment, FOB terminals.)

	Dec. 11	Dec. 4
Unfiltered Pale Oils:		
Vis. Color		
100 No. 3	6.00	5.75 – 6.00
200 No. 3	7.50 – 8.00	7.50 – 8.00
300 No. 3	8.00 – 8.50	8.00 – 8.50
500 No. 3½	9.00 – 9.50	9.00 – 9.50
750 No. 4	9.50 –10.00	9.50 –10.00
1200 No. 4	10.00 –12.00	9.875–12.00
2000 No. 4	10.25	10.00
Red Oils:		
Vis. Color		
100 No. 5-6	6.00	5.75 – 6.00
200 No. 5-6	7.50 – 8.00	7.50 – 8.00
300 No. 5-6	8.00 – 8.50	8.00 – 8.50
500 No. 5-6	9.00 – 9.50	9.00 – 9.50
750 No. 5-6	9.50 –10.00	9.50 –10.00
1200 No. 5-6	10.00 –12.00	9.875–12.00
2000 No. 5-6	10.25	10.00

Note: Red oil prices cover oils with green cast; prices for blue cast red oils are slightly lower in some cases.

Tanker Rates

(Approximate freight rates. To Continental ports, shillings per ton of 2240 lbs., British sterling; to U. S. ports cents per bbl.)

	Crude & /or Fuel		Refined Oil & / or Spirits	
	Last Paid	Owners Ask	Last Paid	Owners Ask
Gulf-U.K./Cont.(k)	(q)	(q)	(q)	(q)
Aruba-U.K./Cont.	(q)	(q)	(q)	(q)
Gulf-N. Atlantic (l) (not E. of N.Y.):				
Hvy. Crude & fuel, (10 to 19.9 gravity	51c	48 to 53c	....	....
Light Crude, (30 Grav. or Lighter)	45c	45 to 50c	....	....
Gasoline	....	....	52c	58c
Kerosine	....	....	53c	60c
Light Fuel	....	....	56c	62c

(a) In barge lots. (c) Ships' bunkers. Lighterage, additional at some points, not included. (d) 150 fire point. (e) For San Francisco cargo prices, add 5c per bbl. to cargo prices shown above. (f) Pacific Specification 200. (g) Pacific Specification 400. (h) Shipment in bags or in bulk. (i) Less than ½ of 1% sulfur. (j) Second-hand barrels. (k) Continental ports in range between Bordeaux and Hamburg, both inclusive. (l) Venezuela loading, same rate: Tampico, 2c to 3c per bbl. additional. (m) One supplier quoting. (n) One refiner quoting. (o) No quotations reported. (p) Two refiners quoting. (q) No rates reported. (r) Two suppliers quoting. (s) Sale. (t) Shipment in tight barrels.

CRUDE OIL MARKETS

Prices in $ per bbl. of 42 U. S. gals. at the well. A. P. I. gravity. Prices are effective as of 7 a. m. of dates as given

EASTERN FIELDS

Posted by Joseph Seep Purchasing Agency
(Effective Dec. 1, 1939, except Corning Nov. 4, 1939)

Penna. Grade Oil in Southwest Penna. Pipe Lines $2.15
Penna. Grade Oil in Eureka Pipe Lines (West Virginia) $2.09
Corning Oil in Buckeye Pipe Lines (Ohio) .. $1.12

Posted by Other Companies

Tide Water Associated Oil Co.
Bradford-Allegany district (Penna. and N. Y.) (Effective Dec. 1, 1939) $2.50
*The Pennzoil Co.: (Effective Dec. 1, 1939)
Penna. Grade Oil in National Transit Lines *$2.43
*The Pennzoil Co. posts $2.43 in Cochran, Franklin, Hamilton and Doolittle, Pa. fields, prices in other lower districts range down to $2.38 per bbl. at well.

MICHIGAN

Posted by Pure Oil Co.
(Effective Oct. 9, 1939)

Midland, Midland County $1.02
Sherman $0.97
Clare-Freeman $0.97

Posted by Simrall Corp.
(Effective Oct. 9, 1939)

Crystal, Greendale, Porter, Vernon and Wise $1.02
Beaverton, Buckeye, Bentley, Edenville $1.00
Freeman and Redding $0.97
Arenac $0.82
(Effective Nov. 1, 1939)
West Branch $0.85

Posted by Sohio Corp. (Michigan Division)
(Effective Oct. 9, 1939)

Allegan and Kent Counties $1.03
(Effective Nov. 9, 1939)
Van Buren County $1.03

Posted by Bay Pipe Line Corp.
(Effective Oct. 9, 1939)

Bentley and Buckeye $1.00
Saginaw and Wise $1.02
Clare $0.76

CENTRAL STATES FIELDS

Posted by Ohio Oil Co.
(Effective June 8, 1939)

Illinois and Western Indiana $0.95
Illinois Basin $1.05

Posted by Sohio Corp.

Illinois Basin:
(Effective Oct. 21, 1939)
Salem (Lake Centralia) $1.05
(Effective June 8, 1939)
Balance of Illinois Basin $1.05
(Effective Oct. 10, 1939)
Griffin (Ind.) pool, sand wells $0.95
Griffin (Ind.) pool, McCloskey lime $0.85

Posted by Carter Oil Co.
(Effective June 10, 1939)

Louden, Fayette County, Ill. $1.05

Posted by Ashland Oil & Transportation Co.
(Effective June 9, 1939)

Somerset Oil in Ashland Lines, Kentucky:
Big Sandy River .. $1.02 Kentucky River .. $1.10

Posted by Stoll Oil Refining Co.
(Effective June 10, 1939)

Stoll Pipe Line Oil (Ky.) $0.90

Posted by Fordsville Gathering Line, Inc.
Western Kentucky
(Effective June 9, 1939)

Birk City Area $0.90
Owensboro Area $1.00
Corydon Area (Henderson) $0.90

CANADIAN FIELDS

Posted by Imperial Oil Limited
Western Ontario
(Effective Nov. 6, 1939)

Petrolia ..... $2.10 Oil Springs $2.17

Alberta—Turner Valley
(Prices f.o.b. field tankage)
(Effective Jan. 5, 1938)

Crude Oil			
40 40 9°	$1.14	53-53 9	$1.40
41 41 9	1.16	54-54 9	1.42
42 42 9	1.18	55-55 9	1.44
43 43 9	1.20	56-56 9	1.46
44 44 9	1.22	57-57 9	1.48
45 45 9	1.24	58-58 9	1.50
46 46 9	1.26	59-59 9	1.52
47 47 9	1.28	60-60 9	1.54
48 48 9	1.30	61-61 9	1.56
49 49 9	1.32	62-62 9	1.58
50 50 9	1.34	63-63 9	1.60
51 51 9	1.36	64-64 9	1.62
52-52 9	1.38		
Crude Naphtha, 65 grav. & above			$2.14
Absorption Gasoline			
90% Rec., 20 lb. Reid v.p.			$1.94
90% Rec., 17 lb. Reid v.p.			$2.08

MID-CONTINENT

Oklahoma-Kansas
*(For effective dates, see footnote)

	S. O. Indiana	Carter Mag-nolia Shell	Conti-nental Texas Co.	Sin-clair Prairie
Below 21°	$0.70	$0.60	....	....
21-21 9	.72	.63	....	....
22-22 9	.74	.66	....	....
23-23 9	.76	.69	....	....
24-24 9	.78	.72	....	....
25-25 9	.80	.75	....	$0.58
26-26 9	.82	.78	....	.63
27-27 9	.84	.81	....	.68
28-28 9	.86	.84	$0.86	.73
29-29 9	.88	.87	.88	.78
30-30 9	.90	.90	.90	.82
31-31 9	.92	.92	.92	.86
32-32 9	.94	.94	.94	.90
33-33 9	.96	.96	.96	.96
34-34 9	.98	.98	.98	.98
35-35 9	1.00	1.00	1.00	1.00
36-36 9	1.02	1.02	1.02	1.02
37-37 9	1.04	1.04	1.04	1.04
38-38 9	1.06	1.06	1.06	1.06
39-39 9	1.08	1.08	1.08	1.08
40 & above	1.10	1.10	1.10	1.10

*Effective in 1938 by Carter Oil, Oct. 13, posting in Okla. only; Continental Oil, Oct. 11, with lowest grade below 29; Magnolia, Oct. 12, posting in Okla. only; Shell, Oct. 22; S. O. Indiana, Oct. 17; The Texas Co., Oct. 12. Aug. 31, 1939, by Sinclair Prairie.

North-North Central and Central Texas
*(For effective dates, see footnote)

	Stano-lind	Sinclair Texas Co. Conti-nental Magnolia
Below 21°	$0.60	....
21-21 9	.62	....
22-22 9	.64	....
23-23 9	.66	....
24-24 9	.68	$0.79
25-25 9	.70	for
26-26 9	.72	oil
27-27 9	.74	below
28-28 9	.76	29°.
29-29 9	.78	.81
30-30 9	.80	.83
31-31 9	.82	.85
32-32 9	.84	.87
33-33 9	.86	.89
34-34 9	.88	.91
35-35 9	.90	.93
36-36 9	.92	.95
37-37 9	.94	.97
38-38 9	.96	.99
39-39 9	.98	1.01
40 & above	1.00	1.03

*Effective Oct. 11, 1938 by Continental, in North Tex.; Oct. 12, 1938, by Texas Co. in North & North Central Texas. Texas Co.'s lowest grade is 28-28.9, at $0.79; by Magnolia, Dec. 3, 1938, in N. and N. Central Texas; Oct. 5, 1939 by Sinclair Prairie in Mexia and N. Cent. Texas.

Jefferson County, Texas—Beaumont
(Posted by Magnolia Petroleum Co., Effective Oct. 2, 1939, and by Stanolind Oil & Gas Co., for West Beaumont, Effective Oct. 2, 1939)

Below 20°	$0.86	30-30 9	$1.08
20-20 9	.88	31-31 9	1.10
21-21 9	.90	32-32 9	1.12
22-22 9	.92	33-33 9	1.14
23-23 9	.94	34-34 9	1.16
24-24 9	.96	35-35 9	1.18
25-25 9	.98	36-36 9	1.20
26-26 9	1.00	37-37 9	1.22
27-27 9	1.02	38-38 9	1.24
28-28 9	1.04	39-39 9	1.26
29-29 9	1.06	40 & above	1.28

TEXAS FIELDS

Posted by Humble Oil & Refining Co.
**West Central Texas*
(Effective Aug. 11, 1939)

24-24 9	$0.71	33-33 9	$0.89
25-25 9	.73	34-34 9	.91
26-26 9	.75	35-35 9	.93
27-27 9	.77	36-36 9	.95
28-28 9	.79	37-37 9	.97
29-29 9	.81	38-38 9	.99
30-30 9	.83	39-39 9	1.01
31-31 9	.85	40 & above	1.03
32-32 9	.87		

*Includes Brown, Callahan, Coleman, Comanche, Eastland, Fisher, Haskell, Jones, Shackelford, Stephens, Throckmorton and Young Counties.

Effective Aug. 29, 1939, Shell posted in Fisher county, Tex., prices 3c lower than Humble's West Central Texas prices; Shell's schedule begins with below 25, at $0.68 and ends with 40 & above, at $1.

Note: Effective Oct. 1, 1937, Humble prices are based on 100% tank tables at 60F.

**East Central Texas*
(Effective Aug. 11, 1939)

23-23 9	$0.78	32-32 9	$0.96
24-24 9	.80	33-33 9	.98
25-25 9	.82	34-34 9	1.00
26-26 9	.84	35-35 9	1.02
27-27 9	.86	36-36 9	1.04
28-28 9	.88	37-37 9	1.06
29-29 9	.90	38-38 9	1.08
30-30 9	.92	39-39 9	1.10
31-31 9	.94	40 and above	1.12

Posted by Pan American Pipe Line Co.
(Effective Oct. 2, 1939)

Cayuga, Anderson county $0.78
*Including Anderson, Cherokee, Limestone, Navarro counties.

PANHANDLE TEXAS

	Humble (Aug. 11, 1939)		Texas Co. (Oct. 2, 1939)	
	Gray County	Carson-Hutchin-son	Sweet	Sour
28-28 9	$0.72	$0.67	...	...
29-29 9	.74	.69	...	...
30-30 9	.76	.71	...	...
31-31 9	.78	.73	...	...
32-32 9	.80	.75	...	...
33-33 9	.82	.77	...	...
34-34 9	.84	.79	$0.84	$0.79
35-35 9	.86	.81	.86	.81
36-36 9	.88	.83	.88	.83
37-37 9	.90	.85	.90	.85
38-38 9	.92	.87	.92	.87
39-39 9	.94	.89	.94	.89
40 & above	.96	.91	.96	.91

Effective Aug. 31, 1939, Sinclair Prairie met Humble in Panhandle Texas. Dec. 3, 1938, Magnolia posted same schedule as Humble.

***EAST TEXAS**

By Humble, Shell, Sinclair-Prairie, Stanolind, Gulf, Magnolia, Texas Co., Tide Water-Associated $1.10
*Effective dates: Aug. 11, 1939, by Humble and Tide Water-Associated; Aug. 29, 1939, by Stanolind, Oct. 2, 1939 by Sinclair Prairie; Oct. 5, 1939 by Shell; Oct. 12, 1938, by Magnolia, Texas Co.; Oct. 13, 1938, by Gulf.
*Includes Cherokee, Gregg, Rusk, Smith and Upshur counties.

Posted by Shell Oil Co., Inc.
(Effective Oct. 5, 1939)

Polk County, Tex. (Livingston and Schwab-Wilcox areas) $1.10

NORTHEAST TEXAS

(Posted by Humble, Oct. 2, 1939)

Talco $0.65

(Posted by Magnolia, Oct. 12, 1938)

Cass County and Panola County, Tex.:
Magnolia posts below 25° at $0.73, plus 2c differential for each degree, to top grade of 40 & above, at $1.05.

(Posted by The Texas Co., Oct. 12, 1938)

Cass County $1.05

WEST TEXAS and NEW MEXICO

(a) (For effective dates, see footnote)

	Humble	Stano-lind	Shell	Texas Co. Sinclair (c)
Below 20°	$0.53	...	$0.53	...
20-20 9	.55	...	.55	...
21-21 9	.57	...	.57	...
22-22 9	.59	$0.67	.59	...
23-23 9	.61	for	.61	...
24-24 9	.63	oil	.63	...
25-25 9	.65	Below	.65	$0.65
26-26 9	.67	26°.	.67	.67
27-27 9	.69	.69	.69	.69
28-28 9	.71	.71	.71	.71
29-29 9	.73	.73	.73	.73
30-30 9	.75	.75	.75	.75
31-31 9	.77	.77	.77	.77
32-32 9	.79	.79	.79	.79
33-33 9	.81	.81	.81	.81
34-34 9	.83	.83	.83	.83
35-35 9	.85	.85	.85	.85
36-36 9	.87	.87	.87	.87
37-37 9	.89	.89	for	for
38-38 9	.91	.91	oil	oil
39-39 9	.93	.93	36° &	36° &
40 & above	.95	.95	above.	above.

Posted by Magnolia Petroleum Co.
(Effective Oct. 12, 1938 in West Texas; Oct. 15, 1939 in Lea County, N. Mex.)

	West Texas	N. Mex.		West Texas	N. Mex.
Below 25	$0.63	$0.63	33-33.9	$0.81	$0.81
25-25.9	.65	.65	34-34.9	.83	.83
26-26.9	.67	.67	35-35.9	.85	.85
27-27.9	.69	.69	36-36.9	.87	.87
28-28.9	.71	.71	37-37.9	.89	for
29-29.9	.73	.73	38-38.9	.91	oil
30-30.9	.75	.75	39-39.9	.93	36 &
31-31.9	.77	.77	40 & over	.95	above
32-32.9	.79	.79			

Note: Magnolia's West Texas postings are in Crane, Glasscock, Howard, Mitchell, Upton and Winkler counties.

Pecos County, West Texas
(Posted by Humble Aug. 11, 1939 and Shell, Aug. 29 '39)

Pecos $0.78
Yates Shallow Pool (Shell only) ..... .65

Posted by Sinclair Prairie Oil Marketing Co.
(Effective Aug. 31, 1939)

Eddy county, N. Mex. $0.77

(a) Effective Aug. 11, 1939 by Humble; Shell Oil, Aug. 29, 1939; by The Texas Co., Oct. 12, 1938; Stanolind, Aug. 29, 1939; Sinclair Prairie, Aug. 31, 1939.

(c) Texas Co. posts $0.65 for below 26; Sinclair Prairie, $0.63 for below 25.

Note: Humble's postings are in these counties: Andrews, Crane, Crockett, Ector, Gaines, Glasscock, Howard, Reagan, Upton, Winkler and Yoakum, West Texas; and Lea county, N. Mex.; Shell, in Crane, Ector, Glasscock, Howard, Upton, Winkler, Yoakum, Lea; Stanolind in Hendrick and Henderson field, Winkler county; Texas Co. in Ward, Winkler and Lea.

Posted by Continental Oil Co.
(Effective Oct. 11, 1938)

Artesia, Jackson and Maljamar pools, New Mexico; gravity schedule beginning with below 29, at $0.61; 29-29.9, at $0.63; plus 2c differential for each gravity, up to 40 & above, at $0.85.

COLORADO

Posted by Continental Oil Co
(Effective Oct. 11, 1938)
Ft. Collins and Wellington

Below 29	$0.81	35-35.9	$0.95
29-29.9	.83	36-36.9	.97
30-30.9	.85	37-37.9	.99
31-31.9	.87	38-38.9	1.01
32-32.9	.89	39-39.9	1.03
33-33.9	.91	40 & above	1.05
34-34.9	.93		

Canon City and Florence, Col $0.90

SOUTH AND SOUTHWEST TEXAS

All Shown Below Posted by Humble Oil & Refining Co.
(Effective Aug 11, 1939)

Carroll, Clark, Darst Creek, Hilbig, Salt Flat and Zoboroski crudes $0.96
Van crude $0.92
Conroe $1.27
(Effective Oct. 2, 1939)
Flour Bluff and Jim Wells County $1.23
(Effective Sept. 14, 1939)
Hardin, Liberty county $1.10

Oct. 12, '38, Magnolia posted $0.96 in Darst Creek; $0.87 in Luling; $0.99 in Lytton Springs; $1.14 for Cleveland, and $1.02 in Hardin, both in Liberty county, Tex.

Oct. 12, '38, The Texas Co. posted $0.96 in Darst Creek.

(Continued on next page)

CRUDE OIL MARKETS

(Continued from preceding page)

***Anahuac-Dickinson**
(Effective Oct. 2, 1939)

Below 20°	$0.81	30-30.9	$1.03
20-20.9	.83	31-31.9	1.05
21-21.9	.85	32-32.9	1.07
22-22.9	.87	33-33.9	1.09
23-23.9	.89	34-34.9	1.11
24-24.9	.91	35-35.9	1.13
25-25.9	.93	36-36.9	1.15
26-26.9	.95	37-37.9	1.17
27-27.9	.97	38-38.9	1.19
28-28.9	.99	39-39.9	1.21
29-29.9	1.01	40 & above	1.23

*Anahuac-Dickinson includes Cedar Point, Fairbanks, Gillock, Hull, Pierce Junction and Raccoon Bend (shallow sand) and Turtle Bay.

Raccoon Bend (Deep sand crude) Tomball and Satsuma
(Effective Aug. 11, 1939)

22-22.9	$0.95	32-32.9	$1.15
23-23.9	.97	33-33.9	1.17
24-24.9	.99	34-34.9	1.19
25-25.9	1.01	35-35.9	1.21
26-26.9	1.03	36-36.9	1.23
27-27.9	1.05	37-37.9	1.25
28-28.9	1.07	38-38.9	1.27
29-29.9	1.09	39-39.9	1.29
30-30.9	1.11	40 & above	1.31
31-31.9	1.13		

Dec. 3, 1938, Magnolia posted above price and gravity schedule in Tomball. Effective Aug. 29, 1939, Stanolind met Humble in Tomball, except that Stanolind's schedule begins with below 29 at $1.07.

LOUISIANA-ARKANSAS
Posted by Standard Oil Co. of Louisiana
(†) (For effective dates, see footnote)

Gravity	*N. La.-Ark. Sweet	Bunkie-Eola, La.	*South La. Sour	*Ark. Sour	Baton Rouge-University
Below 20°					$0.79
20-20.9	$0.73	$0.83	‡$0.74	$0.63	.82
21-21.9	for	for	.77	for	.85
22-22.9	oil	oil	.80	oil	.88
23-23.9	Below	Below	.83	Below	.91
24-24.9	25°.	25°.	.86	25°.	.94
25-25.9	.75	.85	.89	.65	.97
26-26.9	.77	.87	.92	.67	1.00
27-27.9	.79	.89	.94	.69	1.02
28-28.9	.81	.91	.96	.71	1.04
29-29.9	.83	.93	.98	.73	1.06
30-30.9	.85	.95	1.00	.75	1.08
31-31.9	.87	.97	1.02	.77	1.10
32-32.9	.89	.99	1.04	.79	1.12
33-33.9	.91	1.01	1.06	.81	1.14
34-34.9	.93	1.03	1.08	.83	1.16
35-35.9	.95	1.05	1.10	.85	1.18
36-36.9	.97	1.07	1.12	.87	1.20
37-37.9	.99	1.09	1.14	.89	1.22
38-38.9	1.01	1.11	1.16	.91	1.24
39-39.9	1.03	1.13	1.18	.93	1.26
40 & above	1.05	1.15	1.20	.95	1.28

(Effective Aug. 30, 1939)

Smackover, Ark	$0.73
Cotton Valley Distillate	$1.20

*N. La.-Ark. Sweet includes Caddo, Cotton Valley, Cross Lake, De Soto, Haynesville, Homer, Rodessa, Sabine and Sligo, La. crudes, and Miller county, Ark. S. La. Sour includes Choctaw, Darrow, N. Crowley, Roanoke and St. Martinsville. S. Ark. Sour includes Buchner, Magnolia and Village pools.

†N. La.-Ark. Sweet crude and S. La. Sour effective Aug. 30, 1939, except Cross Lake, La., Sept. 7, Baton Rouge-Univ., Sept. 11, and Bunkie and Eola, Oct. 23, 1939; and Ark. Sour, Sept. 13, 1939.

‡For Below 21°.

Effective Sept. 8, 1939, Gulf Refg. Co. met S. O. La's. N La.-Ark. Sweet prices in Bull Bayou, Caddo, Crichton, De Soto, Haynesville, Homer, and El Dorado.

Posted by Arkansas Fuel Oil Corp.
(Effective Jan. 28, 1937)

Urania, La.	$1.02

Posted by Continental Oil Co.
(Effective Oct. 11, 1938)

Tepetate and Ville Platte, La.	$1.03

(Effective Jan. 1, 1939)
Abbeville, La.

Below 36	$0.92	38-38.9	$0.98
36-36.9	.94	39-39.9	1.00
37-37.9	.96	40 & above	1.02

Posted by Caddo Crude Oil Purchasing Corp.
(Effective Aug. 14, 1939)

Allison area, Shreveport field	$0.95

Lisbon, N. La.
(Effective Sept. 14, 1939)

27-27.9	$0.66	32-32.9	$0.76
28-28.9	.68	33-33.9	.78
29-29.9	.70	34-34.9	.80
30-30.9	.72	35 & above	.82
31-31.9	.74		

Lisbon prices met by Gulf, Sept. 14.

Note: S. O. Louisiana prices in all La.-Ark. fields, effective Oct. 5, 1938, are on 100% tank table basis.

GULF COASTAL FIELDS
(a) (For effective dates, see footnote)

Gravity	Humble Sinclair Stano-lind	Refugio Crude (Humble, Conti-nental)	Texas Co.	Shell
Below 20	$0.86	$0.91	$0.86	(b)$0.79
20-20.9	.88	.93	.88	.81
21-21.9	.90	.95	.90	.83
22-22.9	.92	.97	.92	.86
23-23.9	.94	.99	.94	.89
24-24.9	.96	1.01	.96	.92
25-25.9	.98	1.03	.98	.95
26-26.9	1.00	1.05	1.00	.98
27-27.9	1.02	1.07	1.02	1.00
28-28.9	1.04	1.09	1.04	1.02
29-29.9	1.06	1.11	1.06	1.04
30-30.9	1.08	1.13	1.08	1.06
31-31.9	1.10	1.15	1.10	1.08
32-32.9	1.12	1.17	1.12	1.10
33-33.9	1.14	1.19	1.14	1.12
34-34.9	1.16	1.21	1.16	1.14
35-35.9	1.18	1.23	for oil	for oil
36-36.9	1.20	1.25	oil	oil
37-37.9	1.22	1.27	34° &	34° &
38-38.9	1.24	1.29	above.	above.
39-39.9	1.26	1.31		
40 & above.	1.28	1.33		

(Continued in next column)

(a) Effective Oct. 2, 1939 by Continental, Humble and Texas Co.; Oct. 3, 1939 by Sinclair and Stanolind; Aug. 29, 1939 by Shell. Stanolind's lowest grade is below 21, at $0.88. Refugio, effective Oct. 2, '39 by Humble.

(b) Shell posts these prices in Iowa district, Black Bayou and White Castle, La.; prices in Iowa district have 2 lower grades: below 18, at $0.75, 18-18.9, $0.77; and 19-19.9, is $0.79.

Note: Humble's Gulf Coast prices apply in these Texas fields: Amelia, Clear Lake, Goose Creek, Mirando which includes Duval, Jim Hogg, Webb and Zapata counties and Heyser and Placedo fields; Mykawa, Sugarland, Thompsons and Webster.

Humble's prices in Refugio include crudes purchased in Saxet, East White Point, Greta, O'Connor-McFadden, Taft, Plymouth and Tom O'Connor fields.

Stanolind's prices apply in Clinton, Hastings, High Island, South Houston and Spindletop. Magnolia posts Mirando, effective Oct. 2, same prices as Humble. Texas Co.'s prices are in Texas and La., Gulf Coast;its prices on Refugio are same as Humble's up to 28 gravity; 28 & above, $1.09; on Duval-Mirando, same as Humble's up to 28; 28 & above, $1.04; it posts Golden Meadow, La., 24-30 grav., $0.90, plus 2c differential, to 40 & above, $1.10.

Posted by Shell Oil Co., Inc.
(Effective Aug. 29, 1939)

Gibson field, Terreborne Parish, La.	$1.04

ROCKY MOUNTAIN FIELDS
Posted by Stanolind Oil & Gas Co.
(Effective Oct. 11, 1938)

Salt Creek, (except Tensleep crude), Midway and Dutton Creek, Wyo., same schedule as Stanolind posts in Oklahoma-Kansas, ranging from $0.86 to $1.10, which see under Mid-Continent crude on previous page.

Tensleep, Salt Creek field	$0.646
Iles, heavy	0.92
Elk Basin, light	0.90
Grass Creek, light	0.90
Frannie light	0.55
Grass Creek, heavy	0.40
Hamilton Dome, Wyo.	0.35
Frannie heavy	0.42

Posted by Ohio Oil Co.
(Effective Oct. 11, 1938)

Elk Basin, Wyo.	$0.90
Grass Creek, light	0.90
Rock Creek	1.00
Lance Creek	0.77
Dry Creek, Mont.	0.92

(Effective May 1, 1938)

Grass Creek, heavy	$0.50

(Effective Nov. 16, 1937)

Sunburst, Mont.	$0.90

Posted by Continental Oil Co.
(Effective Oct. 11, 1938)

Cat Creek, Mont.	$1.10
Big Muddy, Wyo.	0.98
Lance Creek, Wyo.	0.77

CALIFORNIA, *Posted by Standard Oil of California*

All gravities above those quoted take highest price offered in the field. Prices effective Feb. 26, 1936, except Huntington Beach, Playa del Rey, Santa Fe Springs, Kern Front, Signal Hill (Long Beach) effective March 7, 1936; Elk Hills effective June 22, 1936; Lakeview Area, Aug. 19, 1936; El Segundo and Wilmington, Oct. 15, 1937; Greeley-Canal, July 9, 1938; Montebello, Aug. 11, 1939. Coles Levee-Richfield Western, Oct. 1, 1939.

Gravity	Signal Hill (Long Beach El Segundo †Wilmington	Seal Beach	Alamitos Heights	Huntington Beach	Inglewood	Playa del Rey	Olinda Brea Canon	Athens Rosecrans	Dominguez	Torrance	Richfield	Whittier East Coyote (La Habra)	Montebello	West Coyote Hills	Santa Fe Springs	‡Mountain View ‡Newhall and others	Elk Hills	Buena Vista Hills Midway-Sunset Lakeview Area	Greeley-Canal (Kern County)	Lost Hills	Coalinga	Wheeler Ridge	Coles Levee Richfield Western	Santa Maria Val. (Union Oil, Sept. 1 '39)
14-14.9	$0.80	$0.79	$0.74	$0.78	$0.79	$0.80	$0.76	....	....	$0.80	$0.76	$0.76	$0.77	$0.78	....	$0.70	$0.70	$0.70	....	$0.70	$0.70	....	....	$0.42
15-15.9	.80	.79	.74	.78	.79	.80	.76	....	....	.80	.76	.76	.77	.78	....	.70	.70	.70	....	.70	.70	....	....	.44
16-16.9	.80	.79	.74	.78	.79	.80	.76	....	....	.80	.76	.76	.77	.78	....	.70	.70	.70	....	.70	.70	....	....	.45
17-17.9	.80	.79	.74	.78	.81	.80	.76	....	....	.80	.76	.76	.77	.78	....	.70	.70	.70	....	.70	.70	....	....	.46
18-18.9	.80	.79	.74	.78	.84	.80	.78	....	....	.82	.76	.76	.77	.78	....	.70	.70	.70	....	.70	.70	....	....	....
19-19.9	.82	.79	.74	.82	.87	.84	.81	....	....	.85	.76	.78	.77	.78	....	.70	.74	.74	....	.74	.71	.70	....	....
20-20.9	.85	.79	.74	.85	.90	.88	.84	....	....	.88	.78	.82	.77	.80	....	.70	.78	.78	....	.78	.72	.70	....	....
21-21.9	.88	.79	.74	.89	.93	.93	.88	....	....	.91	.80	.85	.77	.84	.78	.73	.82	.82	....	.82	.74	.70	....	....
22-22.9	.92	.82	.74	.92	.96	.98	.92	....	....	.93	.84	.89	.79	.88	.78	.77	.87	.87	....	.86	.78	.72	....	....
23-23.9	.95	.86	.77	.96	.99	1.02	.96	.84	.79	.96	.88	.93	.82	.92	.78	.80	.92	.92	....	.90	.82	.76	....	....
24-24.9	.99	.91	.80	1.00	1.02	1.06	.99	.88	.81	.99	.91	.96	.85	.96	.82	.84	.97	.97	....	.94	.86	.79	....	....
25-25.9	1.03	.95	.82	1.03	1.05	1.11	1.03	.93	.83	1.02	.95	....	.89	.99	.86	.88	1.01	1.01	....	.98	.90	.83	....	....
26-26.9	1.06	1.00	.85	1.07	1.09	1.16	1.06	.98	.86	1.05	.98	....	.93	1.03	.90	.91	1.06	1.06	....	1.02	....	....	....	....
27-27.9	1.10	1.05	.88	1.11	1.12	....	1.10	1.03	.88	....	1.02	....	.97	1.06	.95	.95	1.10	1.10	$0.91	1.06	....	....	$1.00	....
28-28.9	1.14	1.10	.90	1.14	1.15	....	1.14	1.07	.90	....	1.06	....	1.01	1.10	.99	.99	1.15	1.15	.94	1.10	....	....	1.03	....
29-29.9	1.17	1.15	.93	1.18	1.18		1.17	1.12	.93	....	1.09	....	1.06	1.14	1.03	1.02	1.20	1.20	.98	1.14	....	....	1.06	....
30-30.9	1.21	1.19	.95	1.22	1.21		1.21	1.17	.95	....	....	....	1.10	1.17	1.08	1.06	1.25	1.25	1.02	1.18	....	....	1.09	....
31-31.9					1.24		1.24	1.22	.97	....	....	....	1.14	1.21	1.12	1.09	1.29	1.29	1.06				1.13	....
32-32.9	*Elwood Terrace				1.27		1.27	1.27	1.00	....	....	....	1.18	1.25	1.16	1.13	1.34	1.34	1.09	Kettleman Hills			1.16	....
33-33.9	....	1.28	....	....	....		....	1.32	....	....	....	....	1.22	1.28	1.20	1.17	1.38	1.38	1.13	....	1.19	....	1.19	....
34-34.9	....	1.32	....	....	....		....	1.37	....	....	....	....	1.26	1.32	1.25	1.20	....	....	1.17	....	1.23	....	1.22	....
35-35.9	....	1.35	....	....	....		....	1.42	....	....	....	....	1.30	....	1.29	....	....	....	1.20	....	1.27	....	1.26	....
36-36.9	....	1.39	....	....	....		....	1.46	....	....	....	....	1.34	....	1.33	....	....	....	1.24	....	1.31	....	1.29	....
37-37.9	....	1.43	....	....	....		....	1.51	....	....	....	....	1.38	....	1.37	....	....	....	1.28	....	1.35	....	1.32	....
38-38.9	....	....	....	....	....		....	1.56	....	....	....	....	1.42	....	1.42	....	....	....	1.31	....	1.39	....	1.35	....
39-39.9	....	....	....	....	....		....	1.61	....	....	....	....	1.47	....	....	....	....	....	1.35	....	1.43	....	1.39	....
40-40.9	....	....	....	....	....		....	1.66	....	....	....	....	1.51	....	....	....	....	....	1.39	....	....	....	1.42	....
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43-43.9	....	....	....	....	....		....	....	....	....	....	....	1.63	....	....	....	....	....	1.50	....	....	....	1.51	....
44-44.9	....	....	....	....	....		....	....	....	....	....	....	1.67	....	....	....	....	....	1.54	....	....	....	1.55	....
45-45.9	....	....	....	....	....		....	....	....	....	....	....	1.71	....	....	....	....	....	1.57	....	....	....	1.58	....
46-46.9	....	....	....	....	....		....	....	....	....	....	....	1.75	....	....	....	....	....	1.61	....	....	....	1.61	....
47-47.9	....	....	....	....	....		....	....	....	....	....	....	....	....	....	....	....	....	1.65	....	....	....	....	....
48-48.9	....	....	....	....	....		....	....	....	....	....	....	....	....	....	....	....	....	1.68	....	....	....	....	....

F.O.B. Standard Pipe Line

*F. o. b. ship.

‡Mountain View postings begin at $0.70 for 19-19.9; Newhall and others, which include McKittrick, Kern River, Kern Front and Round Mountain begin with 14-14.9 and end with 19-19.9, all posted at $0.70.

†Wilmington prices differ on gravities below 18.9. Prices are: 14-16.9, $0.75; 17-17.9, $0.77; and 18-18.9, $0.79; rest of schedule same as Signal Hill.

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Water Shipments of Gasoline In Domestic Trade Up In '38

The water movement of crude and petroleum products outranks all other commodities carried on coastal and inland waters of the U. S., with coal and coke in second position. Iron ore, sand, gravel and stone and lumber and logs, in that order, are the other principal commodities using water transportation in great volume to serve domestic markets.

Petroleum and its products was the only leading commodity to show a gain in the use of water transportation in 1938 over 1937, according to preliminary figures of U. S. Engineers.

The following tables of comparative domestic volume of principal commodities moved by water in 1938 and 1937 are unadjusted and thus include duplication in movement in and out of ports and on inland waterways.

Commodity	1938 Domestic Movement (Figures in short tons)	1937 Domestic Movement
Petroleum Products	349,504,518	331,882,051
Coal and Coke	180,373,779	205,063,329
Iron Ore	80,183,306	204,213,666
Sand, Gravel, Stone	77,062,311	88,644,768
Lumber and Logs	42,702,025	51,200,699

Following is a breakdown, by products, of total shown above of domestic movement of petroleum by water for 1937 and 1938. Movement of all products except of crude increased in 1938 over the year previous. The greatest increase was made in shipments of gasoline, which jumped 11,593,055 tons from total domestic movement the year previous.

As above, figures shown below are unadjusted, and include some duplication:

	1938 (Short Tons)	1937
Crude Oil	133,584,036	135,744,312
Fuel and Gas Oil	92,925,798	90,448,433
Gasoline	86,049,991	74,456,936
Kerosine	11,842,434	9,317,276
Lubricating Oil	5,289,593	3,751,748
Other Petroleum	19,812,666	18,163,346
TOTAL MOVEMENTS	349,504,518	331,882,051

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All advertisements carried on this page are payable in advance.

"STRICTLY PERSONAL"

The Chicago Oil Men's Club in the annual business meeting last week elected officers and three directors for next year. **Harry Lightstone,** Kanotex Refining Co., vice-president this year, was elected president. **C. J. Wood,** Harry P. Dunn Co., secretary this year, was elected vice-president. **Jack S. Schurman,** Standard Fuel & Furnace Co., was elected secretary. **C. H. Saas,** Falley Petroleum Co., was re-elected treasurer. The three new directors are **W. G. Franke,** American Mexican Petroleum Corp.; **R. E. Curran,** Suburban Oil Co.; and **R. G. Satterley,** Shell Oil Co.

* * *

Leon F. Banigan is the representative in Washington of the private truck owners in oil and other industries. Their association is the new National Council of Private Motor Truck Owners.

Among the first interests of the Council will be watching the progress of the "omnibus transportation bill" (S. 2009) still pending before Congress, which would make private carriers subject to the same regulation as is provided in the Motor Carrier Act.

Mr. Banigan has been connected with the Automobile Manufacturers Association and was formerly editor of automobile journals.

Three representatives of the petroleum industry are listed in the Council's roster of officers and directors. **J. W. Sinclair,** of the California Oil & Gas Association, is vice president for the western district; **F. E. Packard** of Chicago, Standard Oil Co. of Indiana, and **T. L. Preble** of New York, Tide Water Associated Oil Co., are directors.

Leon F. Banigan

C. C. Rosenberg, Lexington, Neb., of the Rosenberg Bros. Oil Co., was unable to attend the Nebraska Petroleum Marketers convention last week as he was ill with a cold, and a telegram was read from the convention floor expressing his regrets in not being able to be present.

* * *

Cheers spread over Ohio Standard's offices in Cleveland this week when **Tom Walton** of the refined oil sales department returned to his desk after a siege of illness which had confined him to his home since July. Even the Sohio telephone operators were saying, "It's swell to hear his voice again."

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John J. Francis, of Chicago, advertising manager of the Berry Asphalt Co., was married recently to Grayce Knowles, of Oak Park. Mrs. Francis is the daughter of **A. J. Knowles,** president of the Pure Asphalt Co.

* * *

The Illinois-Indiana Petroleum Assn. elected the following officers for next year at the recent annual business meeting in Robinson, Ill.:

President, **Alex U. McCandless,** Robinson, of Mahutska Oil Co.; first vice-president, **C. C. Carroll,** Marshall, Ill., of Ohio Oil Co.; second vice-president, **A. F. Lager,** Terre Haute, Ind., of the Siosi Co.; treasurer, **T. B. Steele,** Robinson, of Kewanee Oil Co.; secretary, **R. B. Kelly,** Olney, Ill., of the Pure Oil Co.; and executive secretary, **Lee Mulvihill,** of Robinson.

Directors elected are **Tyler Andrews,** of Lawrenceville, Ill., independent producer; **J. T. Cumbie,** Mattoon, Ill., of Magnolia Petroleum Co.; **Wm. S. Corwin,** Robinson, of Tidewater Associated Oil Co.; **W. A. Martin,** Mattoon, Ill., of The Texas Co.; **Wm. A. Watkins,** Mattoon, Ill., of the Carter Oil Co.; **Frank B. Barnes**, Robinson, of Craig & Lowrie; **Wm. Bell,** Robinson, of Bell Brothers; **Frederick Brumme,** Indianapolis, of Premium-Bolyard Co.; **George E. Baldwin,** Bridgeport, Ill., of Snowden & McSweeney Co.; **E. G. Robinson,** Centralia, Ill., of Shell Oil Co.; **C. F. Buchner,** St. Louis, of W. C. McBride, Inc.; **H. H. Weinert,** Fairfield, Ill., of H. H. Weinert, Inc.; **P. E. Taggart**, Bridgeport, Ill., of Big Four Oil & Gas Co.; **Joe King,** Effingham, Ill., of Kingwood Oil Co.; **E. J. Reading,** Evansville, Ind., of Sun Oil Co. and Messrs. McCandless, Carroll, Lager and Steele.

J. M. (Jack) Gardiner, Pittsburgh, of Republic Oil Co., is back on the job following a six weeks vacation in Florida and Virginia. But it's a good bet that he put in several days visiting Republic's new terminal at Tampa and probably some others while "vacationing".

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G. Denny Moore, New York, president of the Gasoline Pump Manufacturers Assn., recently discharged from the hospital following a throat operation, was able to keep his speaking engagement last week at the Nebraska Petroleum Marketers annual convention.

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Lawrence A. Ryan, Fiske Brothers Refining Co., was elected president of the New Jersey Oil Trade Ass'n. at annual meeting at Newark, Dec. 7. **A. L. Saltzman,** Standard Oil Co. of New Jersey, was elected vice-president, and **William Ulrich,** American Oil & Supply Co., treasurer. **Joseph H. Gunn** was re-elected secretary.

More than 300 oil men from northern New Jersey, New York and Pennsylvania, including **Joseph C. Smith,** president of Oil Trades Ass'n. of New York, and **Charles D. Jones,** president of Philadelphia Oil Trade Ass'n., attended the meeting.

New directors of the New Jersey association elected Dec. 7 were: **Frank G. Campbell** and **John E. Jones,** Sun Oil Co.; **Frank P. Gill**, Adam Cook's Sons, Inc.; **A. R. Lange,** Sulfo Corp. of America; **Harold Seywert,** Canfield Oil Co.; **Frank J. Mahoney,** Renick & Mahoney, Inc.; **Milton Maybaum,** National Oil & Supply Co.; **James E.** Sheehan, Fiske Brothers Refining Co.; **Bernard Shoobs,** Shoobsol Co.; and **Fred B. Loeffler,** Gulf Oil Corp.

Theodore W. Osbahr, Solar Fuel Oil Co., retiring president, was presented with a traveling bag by the association.

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Among those attending the executive committee meeting of American Trucking Ass'ns, Inc., here last week, was **Morris L. Wilcox,** Downingtown, Pa., chairman of the Petroleum Transporters Division of A.T.A. Mr. Wilcox is vice president of Leaman Transportation Co.

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H. R. (Hal) Lewis, Warren, Pa., president of Conewango Refining Co., returned last week from an extended business trip in the southwest.

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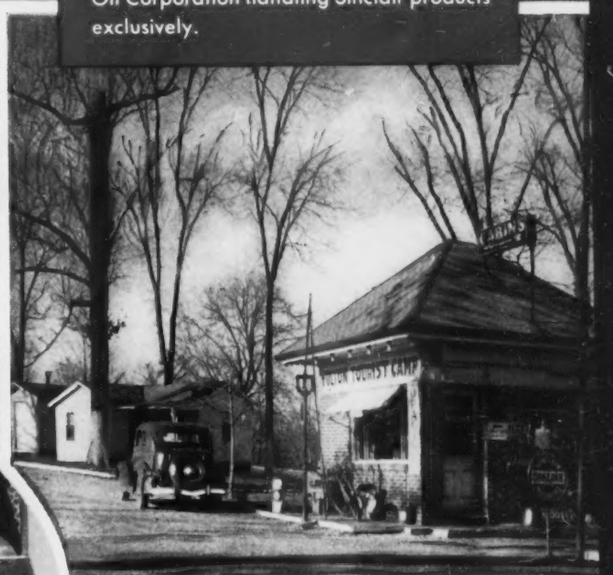
Valvoline Oil Co.'s camp near Kane, Pa., was headquarters for deer hunters the past week end. "Ten deer got shot at," according to **H. J. (Dunny) Dunmire,** refinery sales manager for Valvoline, "but we only bagged two." Other Valvoliners on the party were **Clarence Luton, C. J. La Rue,** and **Jack Dunlevy. Paul Beck,** Butler, Pa., of Pennsylvania Refining Co., and **Ray Luton**, Robinson, Ill., of Ohio Oil Co., also were among the guests.

AND SINCLAIR FRANCHISE LEADER

C. E. BAGLEY Service Station, Mokane, Mo., one of the 22 outlets of Community Oil Corporation handling Sinclair products exclusively.

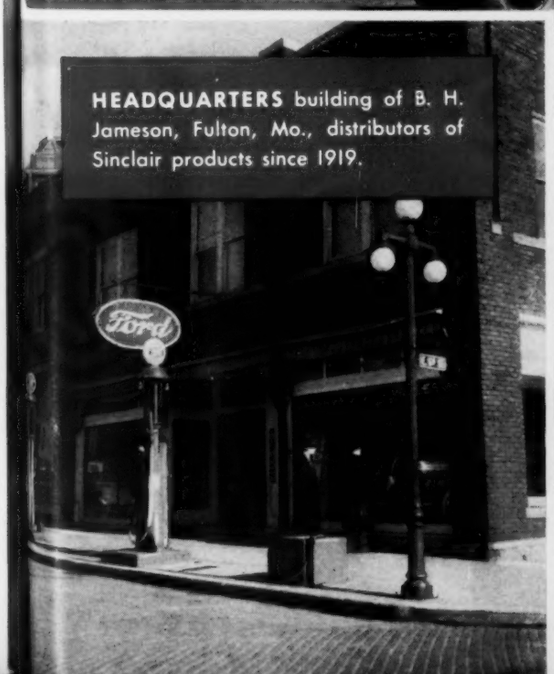
ONE OF THE THREE Community Oil Corp. bulk plants. This plant is at West 9th Street, Fulton, Mo.



TWO of the fleet of four tank trucks operated by Community Oil Corp.

FULTON TOURIST CAMP and Service Station, on the outskirts of Fulton, Mo.—another of Community's 22 retail outlets.

HEADQUARTERS building of B. H. Jameson, Fulton, Mo., distributors of Sinclair products since 1919.



For full particulars about the value of a Sinclair franchise, write the Sinclair office nearest you.

SINCLAIR

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CHICAGO	ATLANTA	KANSAS CITY	FT. WORTH	NEW YORK

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H. E. Butcher

H. E. Butcher, chairman of the Petroleum Refiners Division of the National Assn. of Credit Men, has been with Cities Service organization since his graduation from Kansas State College where he specialized in engineering and credit work.

After graduation in 1914, Mr. Butcher went to Denver as engineer with what is now Public Service Co. of Colorado. Two years later he went to Mansfield, Ohio, with what is now the Ohio Public Service Co.

From utilities to petroleum was the move in late 1918, when Mr. Butcher was transferred to Bartlesville as budget engineer on construction for the former Empire Gas & Fuel Co., now Cities Service Oil Co. of Delaware. From 1921 to 1924 he was superintendent of stores and supplies and assistant treasurer from 1924 to 1933. Mr. Butcher then became attached to the marketing division as general credit manager. He remained in Tulsa until February 1936, then to Chicago when the officers were moved.